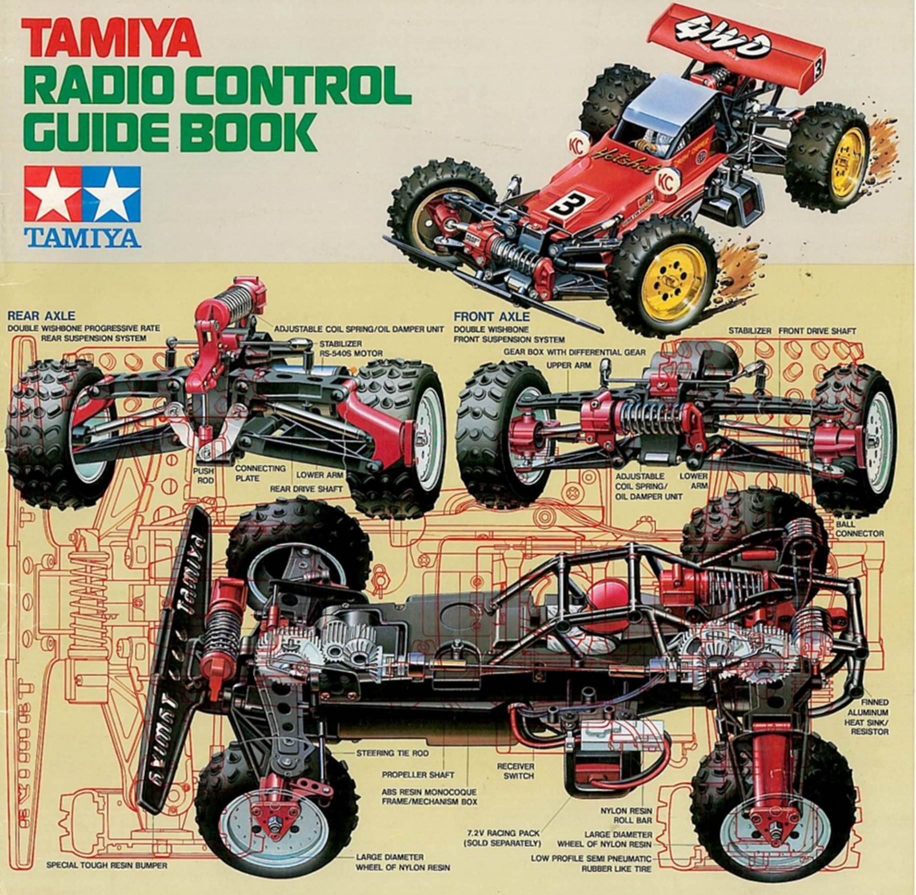
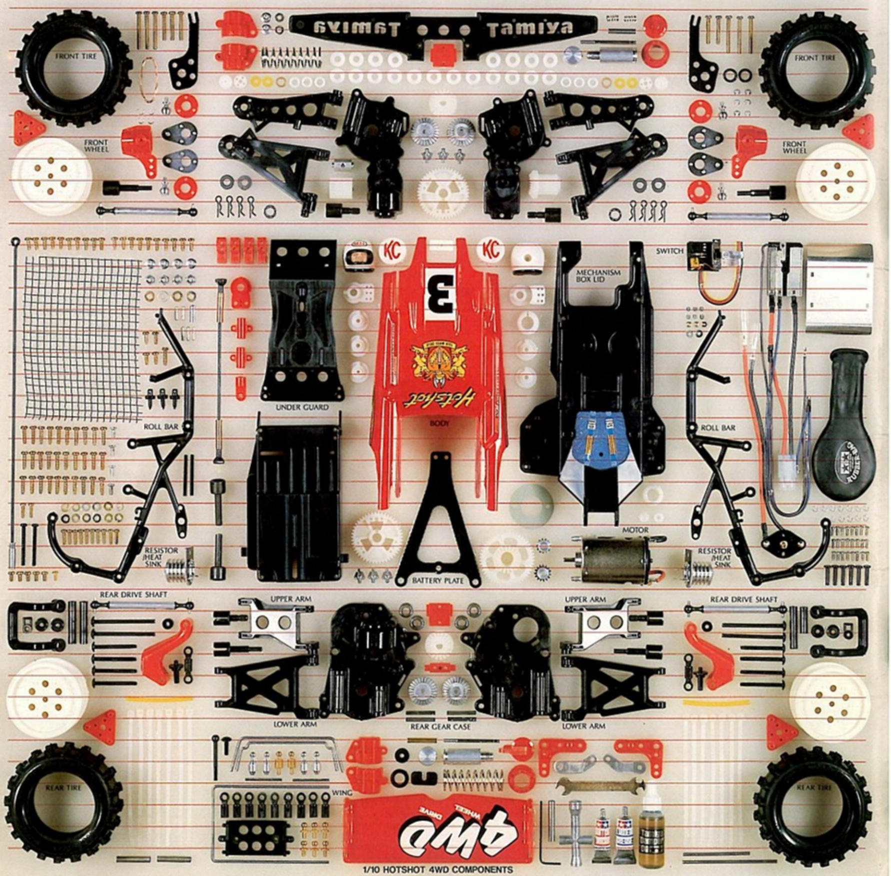
TAMIYA RADIO CONTROL GUIDE BOOK

TAMIYA



4WD
3
KC
Hotshot
REAR AXLE
DOUBLE WISHBONE PROGRESSIVE RATE REAR SUSPENSION SYSTEM
ADJUSTABLE COIL SPRING/OIL DAMPER UNIT
STABILIZER
RS-540S MOTOR
PUSH ROD
CONNECTING PLATE
LOWER ARM
REAR DRIVE SHAFT
FRONT AXLE
DOUBLE WISHBONE FRONT SUSPENSION SYSTEM
GEAR BOX WITH DIFFERENTIAL GEAR
UPPER ARM
STABILIZER
FRONT DRIVE SHAFT
ADJUSTABLE COIL SPRING/ OIL DAMPER UNIT
LOWER ARM
BALL CONNECTOR
TAMIYA
FINNED ALUMINUM HEAT SINK/ RESISTOR
STEERING TIE ROD
PROPELLER SHAFT
RECEIVER SWITCH
ABS RESIN MONOCOQUE FRAME/MECHANISM BOX
NYLON RESIN ROLL BAR
7.2V RACING PACK (SOLD SEPARATELY)
LARGE DIAMETER WHEEL OF NYLON RESIN
LOW PROFILE SEMI PNEUMATIC RUBBER LIKE TIRE
LARGE DIAMETER WHEEL OF NYLON RESIN
SPECIAL TOUGH RESIN BUMPER



1/10 HOTSHOT 4WD COMPONENTS

In Japan to-day radio control models are enjoying a tremendous boom. This boom has been brought about largely by the lead given by the Tamiya Plastic Model Company. Tamiya has, through its advanced thinking, revolutionised the whole Japanese radio control market. For some time now, Tamiya in its efforts to promote its own items suitable for radio control, has produced a manual to guide the beginner and expert alike. This manual has previously only been available in Japanese language. The English version which we hope you will enjoy, is a literal translation from the Japanese. In some countries outside of Japan, the racing of radio controlled vehicles is already established with rules and regulations already laid down by an organising body. However, the market in Japan to a large extent, has been developed by Tamiya. The development is best judged by the success of Tamiya, who currently proudly claim 80% of the Japanese market. To give you some indication of the boom, Tamiya's first model, the Porsche 934, sold more than 100,000 pieces in Japan alone. We trust you will enjoy reading of some of the ways in which Tamiya has developed this hobby and be encouraged to copy their example.

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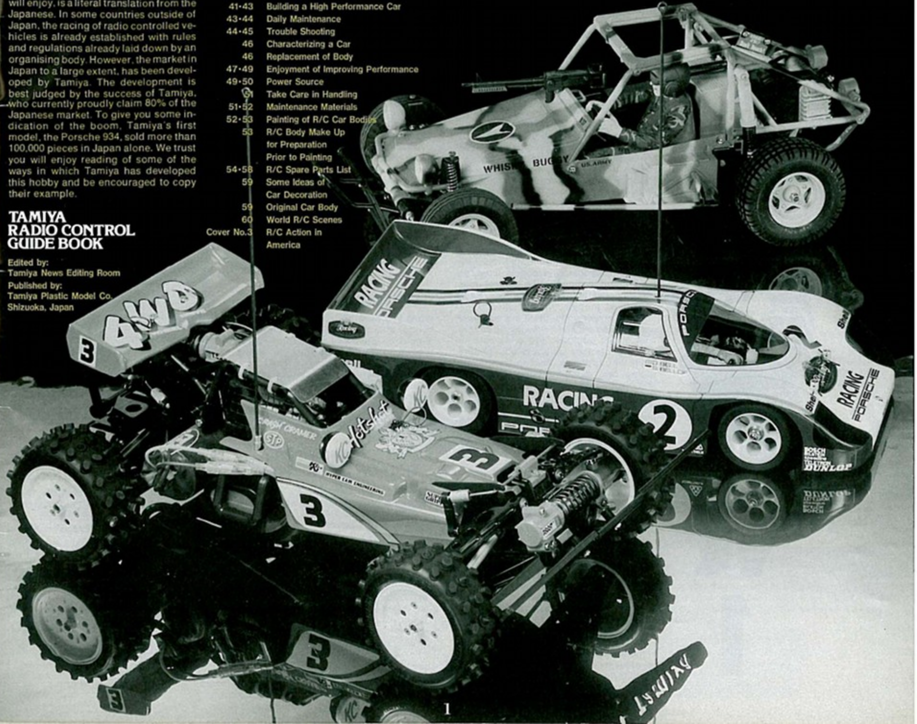
Cover No.2 Hotshot 4WD Components
2·4 Enjoy Radio Control
5 Versatility of Tamiya Products
6·7 Driving Technique
8·9 Winning Races
10 Driving in Rain
11·12 Guidance to Participating in a Race
12·14 Guidance for Organizing Competition
15·16 The Challenge of Le Mans
17 Off Road Driving Care
18 Hints in Building up 4×4 Vehicles
19·20 How to Build a Circuit
21·40 R/C Cars and Tanks
41·43 Building a High Performance Car
43·44 Daily Maintenance
44·45 Trouble Shooting
46 Characterizing a Car
46 Replacement of Body
47·49 Enjoyment of Improving Performance
49·50 Power Source
51 Take Care in Handling
51·52 Maintenance Materials
52·53 Painting of R/C Car Bodies
53 R/C Body Make Up for Preparation Prior to Painting
54·58 R/C Spare Parts List
59 Some Ideas of Car Decoration
59 Original Car Body
60 World R/C Scenes
Cover No.3 R/C Action in America

Toys they're not.



ENJOY RADIO CONTROL

ENJOY RADIO CONTROL

A great number of people today are enjoying radio controlled models. They find excitement in the precise mechanism and excellent maneuverability of these models. Some people enjoy customizing to increase their performance and, furthermore, organize races and competition. All of these categories offer limitless enjoyment to the fans. The reliable radio control unit, which was once a very expensive gadget, has come to be within a reasonable price range as the science of electronics has advanced. Also new car and airplane kits are coming on the market one after another in increasingly refined form. The radio controlled electric car models are becoming more popular among not only novices but also skilled modelers because of high performance in spite of their easy handling. Many enthusiasts are attracted by the exciting operation and realistic make up of radio controlled electric tanks, too.

This guide book is compiled to focus on the fundamental knowledge of the radio controlled electric model cars, on hints of assembly and adjustment, on operating techniques, and on racing, with our hope that the book can be instructional and help you enjoy the sport as well.

1. RADIO CONTROLLED MODELS

Radio controlled models are nothing but models remotely controlled by radio signals. So most operating models, if they are big enough to mount radio control units, can be converted for radio control. Radio controlled models are classified under kinds of power units; there are ones with gas powered engines, with electric motors, with steam engines, and ones with no power units like sailboats and gliders. There are airplanes, helicopters, gliders, racing cars, buggies, tanks, boats and some others, each of which has many fans.

However, as for the radio control units, most of them in use today are fundamentally the same; they are the digital proportional type, although their capability varies from unit to unit.

2. RADIO CONTROLLED ELECTRIC CAR

The ideal radio control vehicle for a novice modeler to start with is the electric car. And yet, because of their high performance, a number of adept modellers organize races of the electric car in many places. In fact, throughout the world the radio control electric car has the largest number of enthusiasts. As a result, there are many kinds of these models on the market, from large ones of 1/8 in scale to the smaller 1/24. The one most abundant car type and most intensively manufactured by makers is 1/12 scaled products.

In the case of 1/8 scale, there are less variety of car styles and races are less frequently held. As for 1/20 and 1/24 scale, many kinds are seen on the market and spare plastic bodies of the sizes are also available at the market for variety's sake. However, most of them are of toy quality. It is not easy to assemble and adjust full-fledged models of the small size, which are difficult to work on. 1/12 scale cars are most suitable for a modeler whose intention is to enjoy full fledged radio controlled cars and from time to time to participate in official competition. For the present, most radio controlled electric cars are scaled after real racing cars. Some off-the-road buggies in 1/12 scale have been put on the market, and the variety of electric cars seems to be widening all the time.

DIFFERENCE BETWEEN RADIO CONTROLLED MODELS AND TOYS

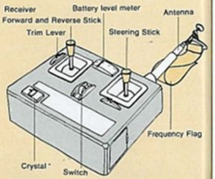
There are many radio controlled toys sold on the market these days. The characteristic of toy products is inferior in capability to models; for instance, they can turn only in one direction or run very slowly. Of course, some of them are close to the border line between models and toys. A conclusive factor is that the toy is always sold in the completed form, while the model is presented in a kit form with components unassembled which are left to you to finish, no matter how little the assembly may be. So the model may be finished in varying levels of performance ability according to the skill of the assembler. Also, they are able to be improved and customized with accessories available on the market. This is another phase of attraction of the model-level products.

RADIO CONTROL SYSTEM

When you have bought a model, a radio control system designated for the model should be purchased separately which then is to be installed into the model, such as an airplane or car.

Most predominant radio control systems on the market today are the digital proportional type. In short, they are called a radio. For radio controlled electric cars and tanks, a two channel digital proportional system is used.

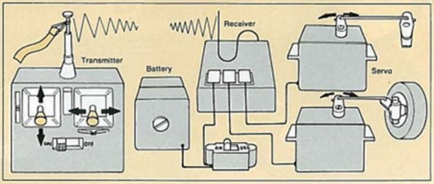
1. MAKEUP AND OPERATION OF DIGITAL PROPORTIONAL



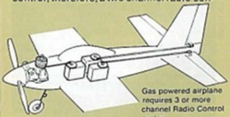
The digital proportional radio control system consists of a transmitter which is to be operated by a modeler, and a receiver and servos which are mounted into the model, and power supplies for the units. A transmitter functions as control box, fitted with operating sticks and trim levers for fine adjustment. When the transmitter is in operation, it emits signals by means of radio waves. The signals are accepted by a receiver and sent to servos, which translate the signals into mechanical movements. A servo motor in the servo rotates in either direction at some velocity for some duration of period according to the signals given. The mechanical movements are put out from a servo horn to a model unit to be controlled. Thus, the whole model can be manipulated. The word "proportional" of "digital proportional" indicates that a model is controlled in proportion to the degree that sticks of the transmitter are moved. When you move a stick quickly, the servo motor rotates quickly and the servo horn moves quickly. When the movement of the stick is stopped halfway, the movement of the servo horn will also stop halfway. In other words, you can control a model car at will by manipulating a stick of the transmitter quickly or slowly, to full range of throw or halfway; the movement of the servo horn is hooked up to be transmitted to, for instance, front wheel of the car. This characteristic of movement has made the digital proportional radio control system the principal type in use today.

2. THE NUMBER OF CHANNELS —THE NUMBER OF CONTROL OPERATIONS

The number of channels of the radio control system indicates the number of

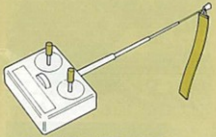


operations to be controlled at a time. A four channel digital proportional system will employ four servos to control four different types of action. The radio controlled electric car is basically designed to be controlled in two ways, speed control and steering control; therefore, a two channel radio control system is to be employed. In the present market, radio control sytems are available with up to eight channels. The two channel type, though the most fundamental, is enough to control cars, tanks, boats, and gliders, except gas powered model airplane (which usually require over three channels).


Gas powered airplane requires 3 or more channel Radio Control system.

3. ABOUT RADIO FREQUENCIES-STATUTORY BANDS FOR RADIO CONTROL

Radio waves are used very widely in the society and are very important for medical emergency, police and military, let alone radio and TV broadcastings. If these radio waves should be interfered with, obvious problems could develop. Therefore, specific frequency radio waves for different purposes are regulated to be handled by qualified personnel for the purpose of avoiding disorder. Thus a number of frequency ranges are designated for model radio control, and any other frequency ranges than the allocated ones should not be used under any circumstances.



4. FREQUENCY BANDS

This phrase "frequency band" is used to denote the frequencies of radio waves. A receiver of the radio control system will accept signals emitted even from another transmitter, if the frequency used happens to be the same the servos will also be put in motion. In other words, radio control systems on the same frequency will respond to each other, thus causing them to go out of control. However, a number of radio control systems all using different frequency bands can control many models. Hence, it is recommended to employ radio control systems with dispersed frequencies to avoid interfering with each other when organizing a new racing event.

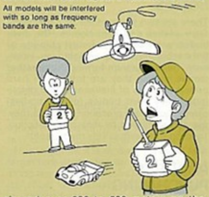
5. SAFETY, REGULATIONS AND OPERATIONAL BEHAVIOUR

Some radio controlled models of airplanes, racing cars and boats powered by gas engines can achieve speeds of over 100 km/h. It can cause serious trouble if they should lose control in the midst of operation; it might involve personal injury. Even electric radio controlled cars can attain speeds of 30 km/h. Be sure to abide by the rules stated below and be careful not to endanger or annoy others:

★Do not use the streets for running model cars.
★Do not operate near children or in crowds.
★Avoid radio interference.
★Inspect your transmitter, receiver and models prior to operation.

RADIO INTERFERENCE IS DANGEROUS

Signal waves of radio control systems sometimes reach about 2 kilometers in the air and over 300 to 500 meters on the ground. When there is another person operating a radio control unit, compare the frequency of your radio control unit with his. Avoid the possibility of interference; operating radio control units of the same frequency will inevitably result in interference and get your model out of control. In such a case use an alternate frequency if possible.


All models will be interfered with so long as frequency bands are the same.

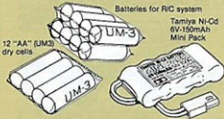
★In radio controlled models, the fixed frequencies are used commonly among cars, airplanes, boats, and any other kind of model. So radio interference will occur so long as the same frequency is used regardless of the difference of types of models. Radio signals from other types of radio control units will interfere with your radio control model.

CHECK UP INTERFERENCE

A device called a "monitor" can be used for detecting radio interference. There is another simple way: get your transmitter away from the model at some distance, and watch response of your servos. If the servos move strangely, interference can possibly be recognized. While operating your models, if you recognize any sign of interference, stop running and check the cause.

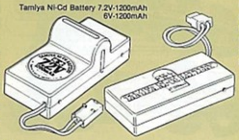
6. POWER SOURCE

Two different batteries are necessary for the radio controlled electric car: one is for operating the radio control system and the other is for driving the car motor. For the radio control unit, about 12 "AA" (UM3) size dry batteries are used in most cases and for powering the motor generally batteries of 3 different types can be used.



HOW TO SELECT AN ELECTRIC SOURCE FOR POWERING CARS

Either dry batteries or nickel-cadmium batteries can be used for the power source of radio controlled electric cars. There are two types of nickel-cadmium batteries: one is a package type and the other is an individual type which has the same shape as dry batteries. Dry batteries are cheaper in cost, but not economical since they are thrown away after complete discharge. Also in performance, dry batteries cannot power the car as fast as nickel cadmium batteries do. It is recommended to use nickel cadmium batteries for operating a full fledged radio control model for greater running time.


Tamiya Ni-Cd Battery 7.2V-1200mAh 6V-1200mAh

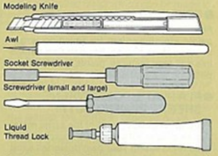
Tamiya Ni-Cd 7.2V-1200mAh Racing Pack
Tamiya Ni-Cd Battery 6V-4000mAh

THE BEST POWER SOURCE IS A NICKEL CADMIUM BATTERY PACK

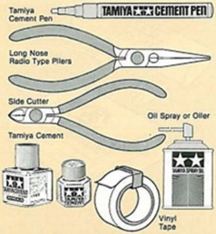
Nickel cadmium batteries have excellent discharge characteristics. They can discharge a great flow of electricity at a time. This is the reason why nickel cadmium batteries can drive a model car several times faster than dry batteries can. They call for a lot of money when you purchase it at the beginning. They will come to be economical in the long run, since they can be recharged about 300 times. Because 1/12 radio controlled electric cars are designed to be able to reduce the speed by changing the gear ratio, nickel cadmium batteries can be used for both races with high speed gear combination and for practice running with the low speed gear combination. They are not only economical, but also handy batteries.

NECESSARY TOOLS AND GLUE

Not many tools are required so long as you assemble a kit as is. The necessary tools are illustrated below. Tools especially in need are included in the kit, or at least an explanation about tools is given.



Handy tools if available are side cutting pliers (radio type and ordinary types), screwdrivers (big and small), diagonal cutting pliers, files, vinyl tape, awls, oiler, glues, cutter, liquid threadlock, box drivers for 3 mm or 4 mm nuts.



●GLUE

As for glues, the following three kinds are adequate for assembly: plastic glue, instant glue, and synthetic rubber cement. Some model kits include a tube of glue; on top of that liquid plastic cement at hand is quite useful. Instant glue is used, for example, to fix a semi-pneumatic tire on the wheels, and synthetic rubber cement for a sponge tire to the wheel.

★Be careful when using instant glue, since it has strong adhesion, requiring only a moment to dry. So it is dangerous to have it in the eye or on the skin.

●LIQUID THREADLOCK

Synthetic rubber cement can be used for locking bolts and nuts but "liquid threadlock" works well for keeping bolts and nuts from getting loose.

●OILER

It is a must to oil the gearbox, shaft, and bearing. When oil is insufficient, it causes lowering of performance, and more serious trouble such as seizure of shafts. Spray type oilers are also available on the market today which are very handy for upkeep of radio controlled model cars.

●FINISHING

Any plastic paint can be used. Spray type paints are convenient for finishing larger areas such as bodies. For painting details like doll face features, paints for brush application are available.

●PLA-PLATE, POLYSTYRENE SHEETS, PLASTIC PUTTY

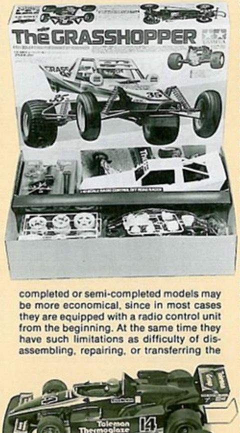
Pla-plate is plastic sheet of the same material as plastic kits. It can be expediently used for creating your own designed wing to the car and for reinforcing bodies and so forth. Putty is handy for mending scratches and small cracks which are often found after remodelling kits. Several kinds of plastic putty are sold at the market.

ADVICE ON SELECTING KITS

The production of plastic model kits is concentrated on the 1/12 scale line by the manufacturers, consequently the products of this size are most abundant in variety. When you buy kits, not only kits of 1/12 but also any size, it is recommended to choose a good store. A good store is one which gives you kind servicing, one which carries an ample stock of parts, one which can be a good advisor in building and radio controlling techniques, one which may organize racing and practice gatherings. Generally speaking, a good store means a very reliable retail store which helps you enjoy radio control. Advice from experienced modelers is very helpful, too. It is a sound way of purchasing kits after asking anything you like to know, and studying contents and performance of the kits by yourself until you can be convinced of a sound purchase.

ASSEMBLY KITS AND COMPLETED MODELS

There are assembly kits on the market which you build up parts into a model by yourself and you buy a radio control unit separately and install it into the model, while completed or semi-completed models are available on the market, too. These completed or semi-completed models may be more economical, since in most cases they are equipped with a radio control unit from the beginning. At the same time they have such limitations as difficulty of disassembling, repairing, or transferring the radio control units into another model. So assembly kits can be recommended for enjoying radio controlling in a real sense. It is not a hard task to assemble kits, either.



READINESS OF PARTS AND COMPONENTS

Select model, the parts of which are easy to obtain. Tires and gears can wear out; even a speed control switch is an expendable component in a sense. Bodies and chassis may have to be replaced after some collisions. In such a case, your models can be mended easily and economically if the repair and replacing parts are available. For the Tamiya models, such components as a ball bearing gearbox and a more powerful motor are available for improving model performance according to a modeler's controlling skill. Spare parts and components for tuning up are essential to make fun out of radio control to a further extent, so choose a model whose parts and accessories are easy to buy at model stores.

HOW TO SELECT A RADIO CONTROL SYSTEM

The price range of radio control systems on the market is very wide. Any two or more channel proportional type can be used. However, radio control systems sold with small servos may be of low performance for gas powered models. It is recommended to get a radio control system with surplus capability for a modeler who has an intention of handling gas engine models. In any event a thorough checkup and consultation with hobby shops are strongly recommended when you choose one. A two channel proportional unit can control most kinds of models like gas powered cars and boats, sailboats and gliders, except most gas engine powered model airplanes.

HOW TO CHOOSE BODIES

There are two kinds of model car bodies: clear bodies and hard bodies. The clear bodies are made of polyvinyl chloride or polycarbonate, featuring lightness. However, being vacuum-formed from rather simple molds, they are inferior to hard bodies in finish of lifelikeness and detailings, while hard bodies (plastic bodies) offer much more precision scale as they are manufactured by means of injection forming from exquisitely made molds.

POINTS IN PURCHASING

The assembly kit consists of numerous parts and accessories. So it is recommended to check up on the contents of a kit with a store attendant at the purchasing point. Also read through the assembly pamphlet to see how difficult or easy it is and ask questions, if any. Also you might as well inquire about the technical guidance and servicing by the store.

FORD C100 & CELICA LB TURBO

HONDA F-2

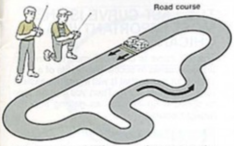
GERMAN KING TIGER

HOTSHOT 4WD

VERSATILITY OF TAMIYA PRODUCTS

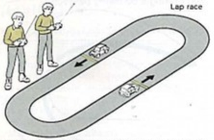
HOW BEST TO ENJOY RADIO CONTROLLED CARS

Speed race, gymkhana, drag race, and rally are the ways you can enjoy radio controlled cars. They are roughly classified into two groups by nature of races. In speed races and drag races, a number of cars start at a time to beat each other in time elapsed; and in gymkhana and rally, cars start one by one to compete against time. The Tamiya radio controlled electric cars will produce various speeds according to the kind of batteries employed. With that feature you can do a number of different racing events, depending upon the size of area, large or small.

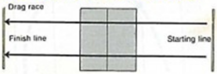


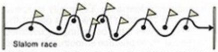
IN LARGE SPACES

If a large open space is available, enjoy speed racing (heat racing). The road course (winding course like a circuit) and simple oval course are typical for use. In this kind of competition, the first to complete a certain number of laps is the winner. On the oval course, the lap race is also run, in which two cars start at the same time from opposite positions on the course, the one which catches up with the other being the winner. If it is difficult to make a road course for only one car, it is recommended to enjoy high-speed gymkhana. Set a course with obstacles of empty bottles or anything like that. The winner is determined by the time required to complete the course.



IN LONG NARROW SPACES

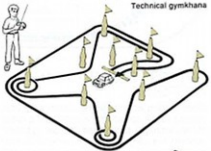


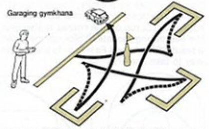


If the space is long but narrow, you can enjoy drag racing or slalom racing. In the drag race, the object is to cover a long straight way distance as quickly as possible. Since this is a simple race, maintenance of your car to attain high performance is of great importance. It may be fun to make a slope on the course which requires proper choice of gear ratio. The slalom race is an interesting variation of the drag race. Here cars start one by one and race against time through a number of pairs of empty bottles placed in various positions on the course so that they must take a serpentine zigzag path. Tamiya's radio controlled car will need a course only about one meter wide.

IN SMALL SPACES

You can enjoy Tamiya's radio controlled car even in a space only about 2 meters square. If the space is limited, it is recommended to race technical gymkhana. Make a course with many curves which need good control technique. The winner is determined by the lowest time required to run the course. Garaging gymkhana, backing gymkhana, etc., may be a lot of fun, too.



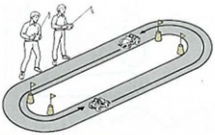


RALLYING

In rally, the car which runs the course in the closest time to a certain fixed time is the winner. The same timing method as the rally can be employed to determine winners of other games. It is recommended to fix a target time after a few timings of trial runs along the course. Various rules can be established; for example, the penalty system is adopted for a time required over the target time, or in both cases of over or short of the target time. By changing a duration of a target time or conditions of a course, the game may be made more enjoyable.

HOW TO USE RADIO CONTROLLED BUGGIES

An off-the-road buggy race has a quite exciting fascination, a different pleasure than racing cars. Compete over a dirt course and cross country race to enjoy exciting driving.



DIRT SPEED RACES

Dirt speed races can be done in flat and vast areas such as a playground or a park. The course can be made in a simple oval course or a more complicated track with hairpin curves and figure "S" curves. You have to be careful since the surface of a dirt course is slippery. Advanced techniques of control are called for, but it is fun.

OBSTACLE RACES

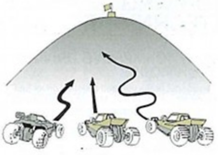
In a place which does not have a very large open space, make an obstacle course. Utilize dents and humps on the ground. Along a curving course with ups and downs, a car will run in an unexpected direction and it is fun to drive cars on it. You can make it more interesting by spreading sand and pebbles.

DIRT GYMKHANA

In a small place or when there is only one car, make a gymkhana course with empty bottles and drive a car through the pylons. By changing the arrangement of the bottles, a backward course may be made. Compete for time one-on-one.

HILL CLIMB

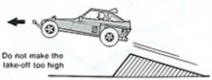
It is a slope ascending race. Any one which arrives at the top of a mound or a slope is the winner. Or you can contend for ranking by how far you can reach on the up-slope in a fixed time. A decisive factor can be the selection of a high gear or low gear combination, and to take a straight way or a zigzag path.



SPECTACULAR JUMPS

Thrilling jumps are another way of putting on a show with a buggy. Have take-off planks in your course. However, do not make it too high. Build a fairly long straight way before the plank to provide an approach run.

Do not run the model car in the following places:


Run fast before jump
Do not make the take-off too high

In a pebby area or with a very bumpy surface, since the suspension system of the car may be damaged; or in a grass covered field, because grass blades may be caught in the car; also, not in a crowd of people or nearby children.

HOW TO ENJOY R/C TANKS

Tamiya model tanks are powerful enough to force their way over rough terrain and to climb obstacles. They will offer you the widest diversity of enjoyment. You are challenged to create various ways of racing with the Tamiya radio controlled tanks which can be made to move right and left, do gradual and pivot turns and, of course, go forwards and backwards.

ON LEVEL PLACES

The simplest slalom games can be enjoyed. Use empty bottles for pylons and run your tanks in the same way as your radio controlled cars. The first to complete the course is the winner. If a bottle is knocked down, one point is deducted from your marks. You can make the racing more interesting by adding slopes to the course.

IN ROUGH PLACES

It will be more fun for you to race powerful tanks on a rugged surface. Obstacles, such as boulders, steep slopes and trenches, can be made a part of the course. A rule could be made to lose marks when a vehicle goes off course or runs backwards. When a tank stalls on the course during a race, the driver is disqualified. The winner is determined by measuring the time taken to complete the course.

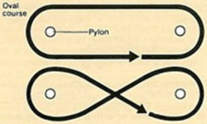
DRIVING TECHNIQUE

HOW TO IMPROVE DRIVING TECHNIQUES

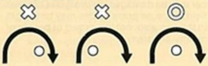
You cannot make yourself a skilled driver just by running a car at will. Make a course using things like empty cans as pylons.

BASIC TRAINING OVAL COURSE 1

This is the simplest course using two cars. It looks simple at first sight to drive a car along, but it will require some practice to achieve sharp and rigid turns made with the pylons as vertexes of the curves. Practice both ways, clockwise and counterclockwise, until you can make both rounds in about the same period of time. Figure "8" drill can also be done in the same track.

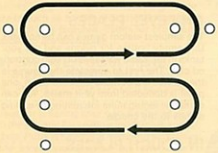


How to take corners



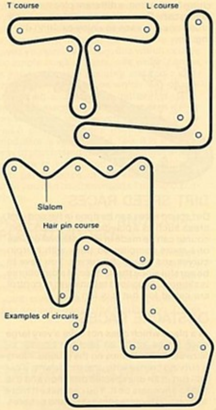
OVAL COURSE 2

Have two or three pairs of pylons forming gates and run your car through them as accurately as possible. You will find it much harder than the oval course No.1. For the first period of time, arrange the pylons at a wide space, narrow them gradually, then at last put them at a space of one meter. Practice in both rotations, clockwise and counterclockwise.



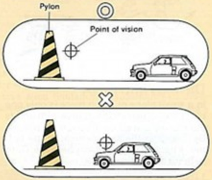
ROAD COURSE

When finishing course No. 1 and No. 2 you have mastered the basic driving techniques. Now you should proceed to complex courses. Build a road course with the pylons, from basic figure "T" and "L" courses to more complicated circuits, assortment of figure "L" and hairpin curves, high speed course and slaloms.



WHERE TO LOOK AT WHEN DRIVING

When you drive a car, it is important where you keep your eye on. Suppose the ovals described are in the field of vision. Put your point of sight on the forward part of the area of vision with a car placed at the rear. The car moves at a rate of 8.3 meters per second when the hourly speed is 30 km/h. With your point of sight on the car itself, you cannot keep clear of obstacles ahead, because it is too late to notice them; nor can you take corners easily.

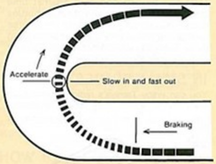


CORNERING TECHNIQUES

No particular skill is required for driving a car just straight, and the drag speed is limited by the car's own inherent performance capability. However, at curves, your finesse of taking corners affects the result even among cars of the same performance. Especially in speed races, the cornering technique is one of the decisive factors. After becoming accustomed to the car, try to practice smooth, speedy and stable cornerings.

THE BASIC PRINCIPLES OF SLOW-IN AND FAST-OUT

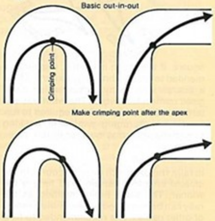
"Slow-In and Fast-Out" is a golden rule in speed controlling at curves. And "Out-In-Out" instructs how to steer a car. Briefly, you should control speed in "Slow-In and Fast-Out" manner and steer a car in "Out-In-Out" way.



WHAT'S "SLOW-IN AND FAST-OUT"

Decelerating when entering into a curve and picking up the speed after a vertex of the curve is the technique. In the case of entering bends without reducing speed, the car is forced to slow down before finishing corners to lose speed and stability. In the worst cases, the car might spin or run off the course. It also gets the car moving too late to pick up speed. As a result "Slow-In and Fast-Out" is the fastest way to take corners.

Basic out-in-out



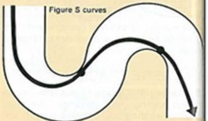
WHAT'S "OUT-IN-OUT"

It is, as illustrated above, a way of turning curves from the outside line of a course into the inside line to which the car will come closest at the vertexes (crimping points) and finishing the cornering approaching back to the outside line, thus making the longest possible turning radius. By utilizing the full width of the course, the car will make an easier turn than the actual curve. So the car may be allowed to run through it faster. As a matter of fact, however, it seems more advantageous to set the crimping point a little after the vertex because it allows easier latter half cornering and enables the car more powerful acceleration into the straight course, in spite of sharper first half cornering.

★Both "Slow-In and Fast-Out" and "Out-In-Out" techniques are established from attaching more importance to velocity in the latter half of cornering than the first half. This has something to do with the acceleration of a car; that is, a car increasing speed faster than other cars at the latter half can take the lead in the successive straight track, provided the cárs should have the same pickup and maximum speed capability. This principle is true anywhere except in a very wide road where you are not required to reduce the speed at all.

THE LAST CURVE IS THE MOST IMPORTANT IN A CHICANE

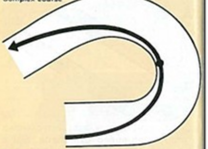
The last curve is the most important in continuous curves. In successive bends of a road, steer your car so that it will make the easiest turn at the last curve. Then you will be able to speed it up as soon as getting into the straight course.



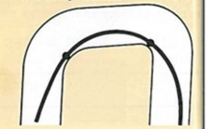
CONSIDER COMPLEX CURVES AS ONE

Consider complex curves as one integrated compound. In the case of complex curves with different radii, you can manage to get through by considering them as one complex curve and making a cornering passage.

Complex course



Curves with a straight in between

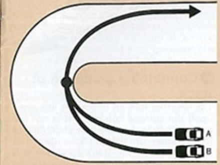


CURVES WITH A STRAIGHT COURSE IN BETWEEN

Even in the case of recurrent curves with straight tracks intervening, you could achieve a smooth cornering by counting them as one integrated curve.

DURING A PRACTICAL RACE, TAKE THE CLOSEST POSITION TO THE INSIDE LINE

Get to the inside lane while still on the straightway prior to the curve. The cornering technique explained is the ideal way when a car is running alone. In actual races, however, when several cars of almost the same capability are competing, naturally other racing techniques have been developed and are used. The most important point is to get the closest position to the inside line of the course ahead of the other competing cars. Here, as illustrated, the passage of car B is sharper than A's and car B will be forced to slow down, but with the advantage of a smaller radius, may be able to get ahead of car A by risking a spinout or being hit from behind by car A. It may block the other oncoming cars. Slower cars should yield the right of way to the faster cars.



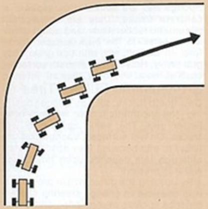
OTHER CORNERING TECHNIQUES

As for other cornering techniques, there exists four wheel drifting and tail sliding like real racing cars do. Four wheel drifting is a technique steering a little excessively at the early stage of a curve and letting all the wheels slide outside with the nose heading for the inside line of the course. In this way the car can get through the curve most quickly; however, it is difficult to practice. The tail sliding technique is to make the rear wheels skid while countersteering. This technique is not as stable as compared with the four wheel drifting, and it may not be fast enough to get through the curve, although it looks spectacular.

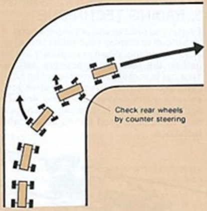
OPPOSITE LOCK STEERING

The word indicates to steer the wheel against the curve of the turn. If a car should go too fast on a curve, the rear wheels might start to skid, to counter the spin steer into the direction of the skid.

Four wheels drift cornering

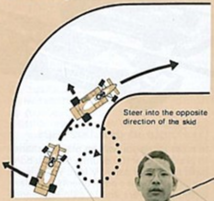


Skidding cornering



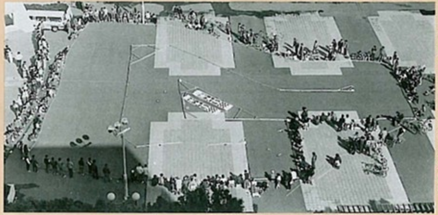
Check rear wheels by counter steering

Counter Steering

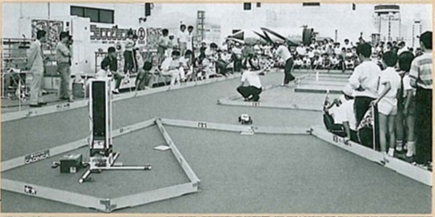


Steer into the opposite direction of the skid

JAPAN AND SINGAPORE FRIENDSHIP RACE



TAMIYA GRAND PRIX HELD IN THE COUNTRY OF JAPAN



RACE ON THE ROOF OF A DEPARTMENT STORE

MEMBERS OF RC TEAM HUB-HUGGERS IN TEX.

WINNING RACES

After mastering the basic driving technique, apply it to practice. If you have been practising in the same place, it is recommended that you change the location from time to time. Also, on certain types of surface you will find it very difficult to control the car because it is liable to spin or run off the course. It is also advisable to run your car with others. Then, the track will appear narrower than usual and you no longer have such freedom of movement. Don't hesitate to take part in racing. Accumulated racing experience is very helpful in racing.

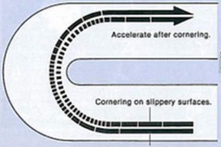
1. DRIVING ACCORDING TO RACE TRACK CONDITIONS

There are various track surfaces; asphalt, concrete, wooden boarding, vinyl tiling, etc., and they all have different characteristics. Practice repeatedly so that you can control the car on any kind of surface. Generally speaking, asphalt or concrete tracks are not slippery because they are rough and have a high coefficient of friction. Wood, vinyl-tiled or cement surfaces are smooth and slippery. Note that even asphalt race tracks are slippery when they are wet or covered with fine sand or dust. It is possible to gauge the track condition by eye, but it is very important to confirm the difference of the surface from your usual practice ground by making a trial run.

● Quick acceleration, quick braking and quick steering are taboo on slippery surfaces.

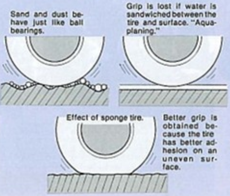
On slippery race tracks, the grip of tires is very small and the stability of the car is disturbed very easily. Quick acceleration is taboo even at the start, because the rear wheels (driving wheels), whose tires have little grip, are liable to spin and the car may slide even when it is turned only slightly. Be even more careful in deceleration. If the car is quickly decelerated, the load of the car will move forward by inertia, (in other words, the center of gravity will move forward), and the load on the front wheels will increase while that on the rear wheels will decrease. Therefore, the grip of the rear wheels will become much less and they will skid very easily. Deceleration must be made as slowly as possible. Never brake the car quickly when it is running at top speed.

Reduce speed sufficiently before cornering. In cornering, the car is subjected to centrifugal force which pulls it outwards. It is because the centrifugal force is greater than the grip of the tires that the car is liable to spin or run out of road on slippery surfaces. The centrifugal force increases in proportion to the speed. Therefore, it is necessary to decrease the centrifugal force by reducing the speed and making the turning radius as large as possible. Needless to say, quick acceleration and quick braking are taboo in cornering. Reduce the speed sufficiently before entering the corner, and increase the speed after completing the turn. It is a cardinal rule that the cornering line should be "out-in-out" so as to make the turning radius as large as possible.


Accelerate after cornering.
Cornering on slippery surfaces.
Cornering on track with good adhesion.

2. CHOOSING TIRES ACCORDING TO TRACK CONDITIONS

The tires have a great influence on the performance of the car. Even when the surface is slippery, it is possible to reduce the chance of skidding by using suitable tires. Many people use sponge or pneumatic rubber tires. Use either of them according to the surface.


Sand and dust behave just like ball bearings.
Grip is lost if water is sandwiched between the tire and surface. "Aquaplaning."
Effect of sponge tire.
Better grip is obtained because the tire has better adhesion on an uneven surface.

● Sponge Tires

Sponge tires are suitable for asphalt or concrete tracks. They are softer than pneumatic rubber tires, and adapt themselves better to the track surface. Therefore, on asphalt, etc, with fine grain, they grip firmly. However, on smooth surfaces, such as wood boarding, they are inferior.

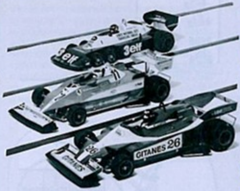
● Pneumatic Rubber Tires

On smooth tracks, such as wooden boarding, the pneumatic rubber tires may offer better grip. The same applies to wet tracks. On wet surfaces, sponge tires are liable to slip because they absorb water, although this depends upon how much water is present.

★By utilizing the different tire properties, it is possible to change steering characteristics such as over-steering and under-steering.

3. RACING TECHNIQUE

Even if you believe you are experienced, it is difficult to display your ability to the full in actual racing. When several cars are together, the racecourse appears narrow. Your car is sometimes involved in an accident, and you may often fail to drive your car along the desired cornering line. To achieve good results in racing, it is necessary to acquire good racing tactics and technique.



(1) Points in practice laps

In most races you will be given a chance to practice over the course, but you don't have to run the car very fast. What is important is to make adjustments by means of the trim levers and to gain knowledge of the track.

● Adjustment with trim levers

Practice is the last chance to make any necessary adjustment by running the car. Make sure the car runs straight and the speed control switch can be turned to maximum speed. If necessary, make fine adjustment by means of trim levers. If the switch contains a brake circuit, make sure that the brake works well. In adjusting the straight running of the car, it is recommended to run it directly away from you.

● Knowledge of the race track

Course errors in racing must be avoided. It is important to do practice running along the course at least once. Particularly if you are on this track for the first time, it is necessary to run the car positively alo
the course in advance without hinderi
the progress of races, as well as to atte
the drivers' meeting. It is advisable,
possible, to walk along the course in ord
to remember its intricacies and to note
condition.

Adjust the straight running
the car by running it direc
away from you.

● Comfirming condition of track

The weather has an important influen
upon the surface condition. It is not t
much to say that tracks vary according
the weather on the previous day. Y
should confirm the track condition a
decide in advance how to negotiate t
main corners. Consider changing t
tires, if you have time, according to t
track conditions.

(2) start

The result of a race sometimes depen
upon the start. However, a quick start
not always advantageous. Accidents a
most liable to occur between the start a
the first corner because participating ca
are running close to one another. Deci
how you should start according to t
characteristics or your car, course layo
etc.

● When a quick start is advantageous

If you have confidence in the starting a

celeration of your car and you believe it is able to out-distance others before the first corner, then you should choose a quick start. Also, if the distance between the start and the first corner is long, a quick start is advantageous. In this case, even if several cars have made a quick start, the distances amongst them gradually increase and, therefore, there is little possibility of collision on the first corner. A quick start is advantageous also when the distance of the race is short or when the course layout is intended mainly for speed competition.

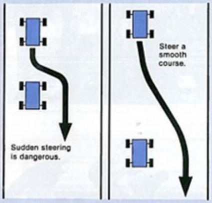
●When a slow start is not disadvantageous:

When you have tuned your car with a greater emphasis attached to its maximum speed rather than on its acceleration, it should be easy to make up for leeway on a straight even if you have made a slow start. In a long-distance race, you don't have to be very nervous about the start. Also, if the distance between the start and the first corner is short, it is advisable to make a slow start to avoid collision on the first corner.

(3) Pace Setting

●Whether to run ahead or behind a rival

Some drivers prefer to run ahead of their rival rather than behind him, whilst others prefer to be in pursuit. They have their own pace setting in races. The former drivers direct their energies particularly to the first half in order to take the lead from the beginning. Drivers of this type need to employ tactics so as not to be passed by their rival. They should avoid leaving a gap on the inside of a curve where they could be passed. Note that if a driver brings his car into contact with any other car on purpose, he may be disqualified from the race. The latter drivers, on the other hand, make a slow start, pursue their rival steadily and wait for him to drop out of the race or try to pass him later. Drivers of this type aim at constant performance. They must be able to pass their rival whenever they get a chance. It is good advice to follow close behind your rival's car hoping to cause him to commit an error and thereby getting a chance to overtake him. Decide whether to be ahead or behind your rival, and employ suitable tactics.



●How to pass others

★Passing on the straight

There are various places in which you can try to pass another car. A straight is the safest place to do so. It is dangerous to start passing a car when you are following close behind it. When you judge it is possible to pass, steer your car a little as soon as possible and attempt to pass. You may pass on either side, wherever there is more room. If the space on each side is about the same, it is advisable to go inside to make the next corner easier to negotiate.

★Passing on a corner

Passing on a corner is dangerous as compared with passing on a straight. If the driver of the car you are going to pass is not skillful in control, your car is liable to be involved in its spinning. To make passing easier, it is advisable to go inside the rival's car and pass it after turning the corner. It is very difficult to pass it on the outside of the corner even if your car is much faster.

If your car has hit another car and lost its stability, then reduce the speed by turning off the speed control switch. If you try to restore stability by steering, the car must be further disturbed. Start acceleration again only after the car has slowed down and is stable.

(4) Pace setting for each heat

●First heat

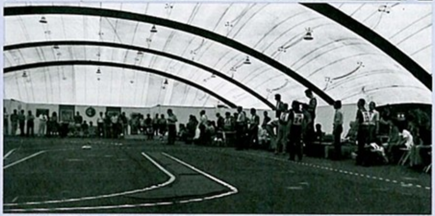
It is impossible to foresee what accidents or trouble will occur in your race. If you damage your car in the first heat by overtaxing it, perhaps you may not be able to achieve a good result in the end. Steady running is the key to success. Use the first heat to verify that your car is handling correctly and running smoothly, and just endeavour to complete the race. Never overtax the car. If it fails to finish, there is little possibility of being allowed to run in the final.

●Second heat

If you run the first heat steadily, you can try your best in the second heat. To obtain a better result than in the first heat, use all your skill and employ more aggressive cornering techniques. If you did not obtain a satisfactory result in the first heat, you may stake your all on the second heat, but you must not drive recklessly. You should refrain, as far as possible, from using tactics that might cause an accident.

●Final race

Being able to take part in the final race already means that you are a qualified driver. Show ability to the full in the final race. From the results in the first and second heats, you can guess your ranking among the finalists. If your ranking seems low, endeavour to raise it, even a little, without aiming at victory. If you seem to rank high among the finalists, you should try to win. As you are capable of winning, or at least a good place, be careful not to be involved in a stupid accident. Always do your best.



DRIVING IN RAIN

It is recommended to refrain from running your car in rain because the radio control mechanism is liable to be affected by water. However, races may be held in drizzle. It is necessary to have some basic knowledge of driving in the rain.

1. DRIVING TECHNIQUE IN RAIN

Any wet race track is very slippery, so cars may spin even when they accelerate at the start. Read the description of driving on slippery surfaces on page 8 and drive your car accordingly. Quick acceleration, quick deceleration and sudden steering are taboo. In cornering, keep the steering angle of the front wheels as little as possible so that the turning radius is large. When there are puddles on the racecourse, avoid them even if your car has to make a detour. If you attempt to drive through deep water, the radio control gear may get wet and your car will be slowed by the resistance of water. Furthermore, your car may skid out of control.

2. WATERPROOFING

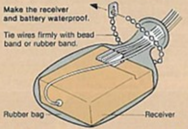
The radio control mechanism, particularly the receiver and servos, contains precision electric circuits carrying weak electric currents for control. If water enters the mechanism, it may cause a short circuit which often causes damage to an electric circuit and makes it impossible to control the car. If a wet electric circuit is kept electrified, its fine wiring begins to corrode gradually by chemical reaction and may be broken even by a slight shock some time later. Such a circuit may become unrepairable. Therefore, the radio control mechanism must be made waterproof. If the weather forecast says it will rain on the day of racing, it is necessary to make the radio control mechanism waterproof in advance.

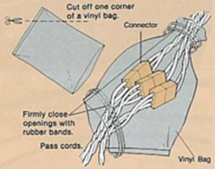
●Waterproofing of car body

It is rare for the radio control mechanism to get wet directly by raindrops because it is contained in the car body. Pay attention to water splashed by the front and rear wheels and water entering the car body through the chassis. Openings in the chassis, such as holes bored to reduce weight, should be stopped up with vinyl tape or similar. Another means for preventing spray from entering the car body is to fix screens of toughened polystyrene sheet or aluminium plate to the chassis parts just in front of, behind, and inside each wheel to deflect the spray.

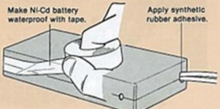
●Waterproofing of radio control mechanism, etc.

The receiver in the radio control mechanism is most likely to be affected by water. To make it waterproof, wrap it in a vinyl bag, the mouth of which is firmly closed by means of a rubber band, as shown in the illustration. It is advisable to apply vinyl tape or similar to the joints of connectors and casing. It is difficult to put servos into vinyl bags because they have moving parts. However, at least their lead wire holes should be filled with synthetic rubber adhesive. The waterproofing of the connectors for the radio control mechanism and traction motor is also important. Put the connectors into a vinyl bag and close it by means of rubber bands. Previously, the switch for the receiver/servos often became faulty because of short circuits, etc., caused by water. Nowadays, it is almost free of such troubles. But, it is advisable to move it to a position which is less liable to become wet, and to apply synthetic rubber adhesive to its lead wire holes. Tamiya Oil Spray will help to waterproof the speed control switch, electric motor, etc. Also, the battery is liable to be affected by water and should also be put into a vinyl bag.


Make the receiver and battery waterproof.
Tie wires firmly with bead band or rubber band.
Rubber bag
Receiver


Cut off one corner of a vinyl bag.
Connector
Firmly close openings with rubber bands.
Pass cords.
Vinyl Bag

NOTE: Page 49 describes the method of using the Tamiya waterproof rubber bags for more permanent protection. Vinyl bags, though cheap and readily available, are prone to tearing easily and will not offer permanent protection such as the Tamiya rubber bags will.


Make Ni-Cd battery waterproof with tape.
Apply synthetic rubber adhesive.

3. MAINTENANCE AFTER RUNNING

On a rainy day, the car gets very wet and dirty, and it is almost impossible to prevent water from entering the car. If it is left as it is, the chassis, etc., may rust and the radio control mechanism may develop unexpected trouble. After using the car in rain, be sure to carry out maintenance as soon as possible.

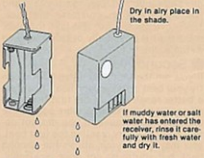
●Maintenance of car body and chassis

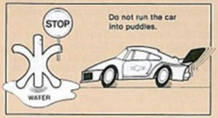
Wipe water off carefully with a soft cloth. The chassis, in particular, should be taken apart, the axles should be removed and thoroughly dried. Oil anew all moving parts because their oil has probably been washed away by water. Adhesive fixing of the servos, etc., may have been weakened by water. It is recommended to refix them with new adhesive. Tamiya Oil Spray gets under water and protects metal surfaces. Use it freely on moving parts.

●Maintenance of radio control mechanism, etc.

Remove all the connectors and wipe off water from the whole mechanism. Then, remove it from the car and dry it in an airy place in the shade. If the receiver is wet inside, remove the casing, wipe off water, and dry in the shade. (The receiver must be handled with care.) If the receiver is wet inside with muddy water or salt water, carefully rinse it with clean water. After it has dried completely carry out a performance test. If it does not work, have it serviced by the manufacturer or his agent. As for the electric motor and speed control switch, it is recommended to apply Oil Spray or similar after carefully wiping off all water. Also dry the battery thoroughly.

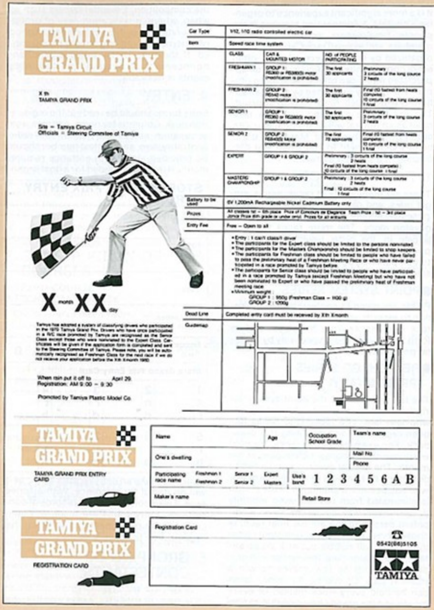
★The RC mechanism contains precision electric circuits. Do not attempt to take it apart.


Dry in airy place in the shade.
If muddy water or salt water has entered the receiver, rinse it carefully with fresh water and dry it.


STOP
Do not run the car into puddles.
WATER

GUIDANCE TO PARTICIPATING IN RACE

Today the radio controlled electric car races are often held in many places promoted by manufacturers and hobby stores. Participate in the official competition when you get used to operating model cars to some extent. If you attain a good score, you will gain confidence. Even with poor grades, you will see better modelers operating a car which is most likely of better performance and helps you to improve your own control technique and your model. You will also find a different kind of delight other than playing with models among just your friends.



TAMIYA GRAND PRIX

X th
TAMIYA GRAND PRIX

Site = Tamiya Circuit
Officials = Steering Committee of Tamiya

X month XX day

Tamiya has adopted a system of classifying drivers who participated in the 1979 Tamiya Grand Prix. Drivers who have once participated in a R/C race promoted by Tamiya are recognized as the Senior Class except those who were nominated to the Expert Class. Certificates will be given if the application form is completed and sent to the Steering Committee of Tamiya. Please note, you will be automatically recognized as Freshman Class for the next race if we do not receive your application before the Xth X month 1980.

When rain put it off to April 29.
Registration: AM 9:00 – 9:30

Promoted by Tamiya Plastic Model Co.

Car Type	1/12, 1/10 radio controlled electric car			
Item	Speed race time system			
	CLASS	CAR & MOUNTED MOTOR	NO. of PEOPLE PARTICIPATING	
	FRESHMAN 1	GROUP 1: RS380 or RS380(S) motor (modification is prohibited)	The first 30 applicants	Preliminary: 3 circuits of the long course 2 heats
	FRESHMAN 2	GROUP 2: RS540 motor (modification is prohibited)	The first 30 applicants	Final (10 fastest from heats compete): 10 circuits of the long course 1 final
	SENIOR 1	GROUP 1: RS380 or RS380(S) motor (modification is prohibited)	The first 50 applicants	Preliminary: 3 circuits of the long course 2 heats
	SENIOR 2	GROUP 2: RS540(S) Motor (modification is prohibited)	The first 70 applicants	Final (10 fastest from heats compete): 10 circuits of the long course 1 final
	EXPERT	GROUP 1 & GROUP 2	Preliminary: 3 circuits of the long course 2 heats Final (10 fastest from heats compete): 10 circuits of the long course 1 final	
	MASTERS CHAMPIONSHIP	GROUP 1 & GROUP 2	Preliminary: 3 circuits of the long course 2 heats Final: 10 circuits of the long course 1 final	
Battery to be used	6V 1,200mA Rechargeable Nickel Cadmium Battery only			
Prizes	All classes 1st – 6th place. Prize of Concours de Elegance. Team Prize: 1st – 3rd place. Junior Prize (6th grade or under only). Prizes for all entrants.			
Entry Fee	Free – Open to all			
	• Entry: 1 car/1 class/1 driver • The participants for the Expert class should be limited to the persons nominated. • The participants for the Masters Championship should be limited to shop keepers. • The participants for Freshman class should be limited to people who have failed to pass the preliminary heat of a Freshman Meeting Race or who have never participated in a race promoted by Tamiya before. • The participants for Senior class should be limited to people who have participated in a race promoted by Tamiya (except Freshman Meeting) but who have not been nominated to Expert or who have passed the preliminary heat of Freshman meeting race. • Minimum weight: GROUP 1: 950g (Freshman Class – 1100 g) GROUP 2: 1200g			
Dead Line	Completed entry card must be received by Xth X month.			
Guidemap				

TAMIYA GRAND PRIX

TAMIYA GRAND PRIX ENTRY CARD

Name	Age	Occupation School Grade	Team's name
One's dwelling			Mail No.
			Phone
Participating race name	Freshman 1 Freshman 2	Senior 1 Senior 2	Expert Masters
Use's band	1 2 3 4 5 6 A B		
Maker's name		Retail Store	

TAMIYA GRAND PRIX

REGISTRATION CARD

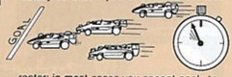
Registration Card

☎
0543(86)5105

TAMIYA

1. APPLICATION FOR PARTICIPATION

Schedule of races may be announced at the hobby stores or in the magazines. It is mandatory to enroll yourself in the contest roster; in most cases you cannot apply to an event on the very day. You are required to give the class and kind of your car and frequency you will use, besides your name and age.

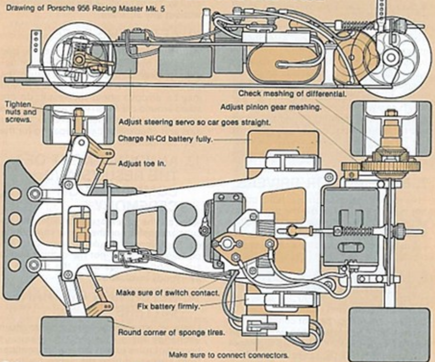


2. CONFIRMATION OF RULES AND REGULATIONS

Rules of racing events usually tell you how the race proceeds, how to determine the winners, how to group the models, kinds of motors and batteries to use. Sometimes detailed regulations are provided to regulate the standard equipment of racing cars. Confirm these rules and regulations beforehand with your car, and remodel or modify if necessary for compliance. In official competition, car inspection will be done at the registration area on the day to see whether or not your car is qualified. Of course, a disqualified model is rejected for competition. Therefore, if there is any point you don't understand in the rules and regulations, you should check it with the host organization.

3. CHECK OUT THE CAR BEFORE THE RACE

Drawing of Porsche 956 Racing Master Mk. 5


Check meshing of differential.
Adjust pinion gear meshing.
Tighten nuts and screws.
Adjust steering servo so car goes straight.
Charge Ni-Cd battery fully.
Adjust toe in.
Make sure of switch contact.
Fix battery firmly.
Round corner of sponge tires.
Make sure to connect connectors.

4. PREPARATION BEFORE THE RACE

Get your car ready for the race by the previous day. The most important is the radio control system, since you are required to place the transmitter in custody of the host organization. Namely, you cannot tune it up on the competition site after registration. On top of that, gear meshing, screws or bolts and nuts, shaft and tires should be carefully looked after; repair or replace with new parts, if necessary. Of course, oil all the rotating parts. If you find batteries are low on power, replace them or charge them fully if rechargeable.

5. THINGS YOU MAY NEED AT THE RACE TRACK

It is needless to say to take a registration card or membership card with you, if anything like that is required. Be sure to bring tools, glue and oil which you use every day. Sometimes you have to mend your car even in the midst of competition. Do not forget to bring fragile parts and accessories which are easy to lose such as screws and bolts. It is advisable, in regards to the length of time of the event, that spare batteries may be recommended to have for caution's sake.

6. REGISTRATION AND CAR CHECK

Leave your home for the race site with ample time for arriving early for registration. Your delay for the registration may upset the whole schedule and annoy others. Very often registration and car check are conducted at the same spot. Undergo the registration desk, you may be given a contest number, perhaps marked on a pennant. During the whole event, you may be referred to with that number when being called or receiving your transmitter; so remember this number. Car check may be done after the registration. Your car will be examined with batteries on board. Even if your car should be disqualified, you might be admitted provided you could repair or modify your car on the spot in accordance with the rules of the organization. After the car check, you are called to hand over your transmitter to the officials. Be sure the switch of the power source is off before handing it over. The reason why transmitters should be impounded by the organization is to avoid interference by intentional or unintentional signals during the races. If a receipt for your transmitter is issued out, do not lose it; sometimes the pennant is used as a receipt to retrieve your transmitter.

7. BRIEFING FOR DRIVERS

Prior to the races, a briefing is held for letting the contestants know the procedures of the competition. Listen carefully, since how the races proceed, penalties for violating rules and other important affairs are explained.

8. MAKING UP A RACING GROUP OR CLUB

In a radio controlled model race, cars on the same frequency cannot compete at the same time. Therefore, those who use different frequencies will make up a competing group. Before the races the combinations of the groups are announced. You should confirm which race you will be in. When time is getting close to your turn, prepare yourself for the race.

9. JUST PRIOR TO YOUR RACE

Your name or number is called to inform you of your turn. Receive your transmitter according to the official's direction; switch on both your transmitter and receiver in the car. Move the sticks of the transmitter and see if the speed control switch operates properly and the front wheels turn firmly right and left.

10. PRACTICE LAP

If you have time to make a round before the race, run your car along the course. There is no need to rush it, but drive leisurely and become familiar with the course. The most important matter is to confirm that the car goes straight on the straight course. If not, adjust it with the trim lever of your transmitter.

11. RACE

Now is the time to start; countdown has begun; try not to be hasty. Be particularly careful not to make a premature start. The first curve right after the starting section is the place where collisions occur most frequently. So drive your car prudently. The point is to keep your coolness during the race. Vying with other cars and taking corners at great speed will most likely result in spinning or sliding off the course. A rule you should keep in mind is to drive your car at your own speed calmly. When you pass another car, try not to hit it from behind. Also, it is etiquette not to hinder a faster car when being passed. During the race, priority should be given to completing the course. Try to finish all the laps designated without any accident.

12. AFTER THE RACE

You have run the complete distance and the race is over. Switch off your transmitter and receiver immediately and return the transmitter to the officials. Although you may be anxious about the result, do not stand around the finish line, as you may be in the way of the officials. Get back to your seat and check your car, preparing for the next competition.

13. ANNOUNCEMENT OF THE RESULTS AND COMMENDATION CEREMONY

After all the races are complete, the results are posted and the winners are honored. The winners should be praised by applause. Whether or not the competition is successful depends upon the attitude of everybody involved.

14. RETURNING OF TRANSMITTERS

Lastly, your transmitter is returned to you in exchange for a receipt. It is a serious breach of rules to pick up your transmitter from custody during the contest without permission. If you have to leave the site before the races are over, you must explain it to the official and get your transmitter returned by him. In such a case, you must keep the transmitter switched off until you are sufficiently away from the race site.

TYPES OF RACES

- **TIME RACE**
- **POINT SYSTEM RACE**
- **LAP RACE**

These three are typical types of races. In the time race, the winners are determined by the time required. In the point system race, points are given according to the ranking of each heat, and the total points make the final record. In the lap race, the number laps a car can make in a certain time decides the winners. Of these, the time race is most common. Sometimes a preliminary game is done by a time race, and the outcome is determined by the order of arrival to the finish line.

MANNERS IN RACE

Spirit of fair play is essential in any game. It is desirable to make a pleasant race event through the fair play spirit of all the participants.

★Transmitters are kept by the host organization without exception.
★Transmitters in custody will not be taken out unless passed by the officials.
★Yield the way when you are about to be a faster car.
★When you hit another car, you should apologize. But do not ask for one after being hit. Responsibility should not be claimed by anyone for any collisions during a race.
★After all the races are over, clean the site. No rubbish should be left behind.

GUIDANCE FOR ORGANIZING A COMPETITION

LET'S ORGANIZE A RACING EVENT

It is a thrill to participate in a race; however, it is a more significant experience to organize a contest. A competition requires many people: timekeepers, course committee members, etc. In small races, such as those organized by hobby stores, players, often serve concurrently as officials. It will be appreciated if you can offer a hand as an official. It is not only welcomed by an organization, but it is also rewarding to yourself. The experience of taking part in a race meet as an official will surely help you with organizing another event. Moreover, it will be of much benefit to you when you participate in a contest as racer.

1. TYPES OF RACES

There are many types of races: series, single ones, and others. It is a common purpose to compete with fellow racers and to develop skills. The more races you participate in, the better results you can expect. Many races are organized in a series to compete throughout the year in order to single out a champion.

●POINT SYSTEM SERIES

Points are given to contestants in proportion to records achieved at each individual race. The winner, 2nd, 3rd places and so forth are determined respectively by the total points accumulated in the series.

●REPECHAGE SERIES (PRELIMINARY)

The big drawback of the point system series is that it is unfavorable to participants who join late. The repechage series has been organized for eliminating this drawback. For example, minor races are held every month to choose a champion of the month. The annual event is conducted to determine a champion of the year. Anyone who has become a champion of the month is eliminated from the following monthly events. In this way, a new champion (competent person to the annual final race) is chosen every month, and contestants from the middle will not be put at a disadvantage. At the same time, this system will give an opportunity to low scores to win a monthly race. Of course, the minor races can be held every week instead of every month and the grand championship can be held semi-annually. Though two types
series have just been introduced, the vi
point of making a race successful lies in
consideration to disperse the chance
winning as widely as possible among
contestants.

2. QUALIFICATION FOR PARTICIPATION

- **OPEN TO ANYBODY.**
- **SOME LIMITATION BY AGE.**

These are two typical systems. It is usua
common that employees or members
the host organization are not eligible, b
they may be admitted under the conditi
that they are eliminated from obtaini
awards and ranking.

3. ANNOUNCEMENT OF A RACE

It can be announced through poste
Handouts are also good media to publici
the competition. Essential factors such
when, where, qualification, way of grou
ing, kinds of cars, type of race and meth
of determining ranking should be descr
ed. If the race is the series system, a
nouncement of dates of the followi
events is desirable.

4. ENTRY

Entry forms should be ready at the regist
tion desk. Columns for name, address, ag
occupation, entry class, frequency of rad
control system, and contest number shou
be provided along with entrance requi
ments. It is recommended for a host orga
ization to make an entry register book, as
will be useful for reference. With a seri
race, it is important to keep records of co
testants. Entry forms are made in dup
cate; one for participant, the other for t
organization to make a ledger.

STORE GRAND PRIX ENTRY CARD

Name
Address

Age (Grade) | Occupation

Class

Car Number (check one)

Frequency Band 1 2 3 4 5 6 A B

Store Grand Prix Entry Card

1st		2nd		3rd		4th	
5th		6th		7th		8th	

5. GROUPING OF CONTESTANTS

- **GROUP BY AGE.**
- **GROUP BY SKILL AND EXPERIEN**

The above two methods are good ways to form groups. There can be a beginner and an advanced class, if sorting is carefully done. Top ranking contestants in the beginner's class can be placed in the advanced class in the next race.

6. GROUPING OF MODELS

- **By batteries**
- **By motors**

Basically there are these two classes. You could classify by types of cars or vehicles or by scale, but grouping by battery type or motor type is probably more satisfactory because the demands of different types of track will alter the battery or motor requirement. On a straight course where cars can race at their maximum speed, there can be a wide difference in result between cars with dry cells and those with nickel cadmium batteries, or amongst cars with nickel cadmium batteries of different voltage. On a track where a lot of corners call for deceleration, it is imperative to have separate classes for cars with RS-380 motors, small but fast running, and those mounted with the big and powerful RS-540 motors.

- **Modified car class**

As a modeller enriches his experience through numerous races and grows familiar with radio control, he is urged to modify and increase the performance of his car. Increasing performance may be endlessly sought after. However, considering the cost of modifications and the finesse required, only a few people may be able to achieve this. It is practical to organise a class of modified cars with some limits set to the amount of remodelling allowed, so that those who do not have the technical knowledge or the necessary finances to carry out major modifications, may participate in the race.

7. CONSTRUCTION OF COURSES

- **SPEED COURSE**
- **TECHNICAL COURSE**

A speed course has a rather long straightaway where it is easy to pick up speed. Performance of a car is a key factor to win or lose a race. So with a speed course, a distinction of cars driven by dry battery from nickel cadmium ones and remodelled car classes are necessary. A technical course consists of a lot of curves, and the driving techniques are more important than capability of a car. With the course, therefore, sorting of classes by car types is not necessarily required. Since the Tamiya cars can go backward, it might be interesting to adopt parking and reverse going courses.

8. REGISTRATION ON THE DAY

- **CAR CHECK**
- **IMPOUNDMENT OF TRANSMITTERS**

Ascertain who the participants are with the entry form. Check if the car is qualified under the requirements of the particular racing class. At the registration desk, impound the transmitters of all the contestants. Of course, return them to assigned racers just before the races begin. As soon as the race is over, the transmitters should be impounded again. In other words, all the transmitters of the contestant are to be under custody of the host organization all the time during the event, except for those which are being used for a race. This is done at any radio control racing gathering for the purpose of preventing interference.

- The transmitters in custody had better have attached a contest number and be kept in a grouping of frequencies.

9. RACE

- **RADIO FREQUENCY CONTROL**
- **RACE ADMINISTRATION**

In a radio controlled car race, cars using the same frequency cannot compete at a time. Reversely speaking, only as many cars as there are different frequencies can race simultaneously. However, to avoid interference, cars with every other frequency should be arranged to compete.

Group / Band			
1	Mr. A	Mr. B	Mr. C
2	Mr. D	Mr. E	Mr. F
3	Mr. G	Mr. H	Mr. I
4	Mr. J	Mr. K	Mr. L
5	Mr. M	Mr. N	Mr. O
6	Mr. P	Mr. Q	Mr. R
A	Mr. S	Mr. T	Mr. U
B	Mr. V	Mr. W	Mr. X

★ Contestants will be grouped under the same frequency bands.

★ Reshuffle the contestants after each heat so they have a chance to compete in many heats.

1st heat (6 races)

Race / Band	1	2		3	4		5	6
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. G			Mr. H			Mr. I	
4		Mr. J			Mr. K			Mr. L
5	Mr. M			Mr. N			Mr. O	
6		Mr. P			Mr. Q			Mr. R
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

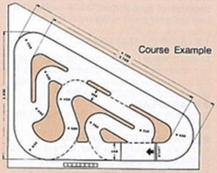
2nd heat (6 races)

Race / Band	7	8		9	10		11	12
1	Mr. A			Mr. B			Mr. C	
2		Mr. D			Mr. E			Mr. F
3	Mr. H			Mr. I			Mr. G	
4		Mr. K			Mr. L			Mr. J
5	Mr. O			Mr. M			Mr. N	
6		Mr. R			Mr. P			Mr. Q
A	Mr. S			Mr. T			Mr. U	
B		Mr. V			Mr. W			Mr. X

When there are eight contestants, a race is formed with four people to participate, making two races. Races are done repeatedly for each combination (each race called "heat" or "round"). Points of each heat are to be summed up to determine the final ranking.

TAMIYA CIRCUIT

This is a full-scale track for motorized RC model cars only. The surface is asphalt paved. The outside course is approximately 100 meters long, and combines with inner tracks to provide more than ten different types of course with a maximum length of 140 meters. The outer track is 4 meters wide, and the inside tracks are 3 meters wide with a variety of hazards including a 180° hairpin bend and "S" shaped turns. Also the entire circuit has a height differential of about 25 cms. So this circuit requires precise control and much skill. It is indeed worthy of challenge!

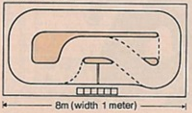


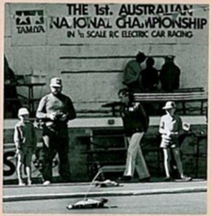
Course Example

The Tamiya Circuit is available for use, completely free of charge, for racing events sponsored by Hobby Shops etc., and it is open to the public without payment, on Saturday and Sunday of each month.
For further particulars, please write to the "Circuit Section" Trade Department, at Tamiya.

Tamiya Plastic Model Co.,
628 Oshika, Shizuoka City Japan, 422,

Course Example




THE 1st. AUSTRALIAN NATIONAL CHAMPIONSHIP
IN 1/10 SCALE RC ELECTRIC CAR RACING
TAMIYA

●KINDS OF RACES

POINT SYSTEM RACE
TIME RACE
ROUND RACE

These three are typical kinds of races. And it is common through these three that the combination of the members should be changed so that any participant has an opportunity to compete with as many other contestants as possible.

●POINT SYSTEM RACE

Points are given to each heat. The points are totaled to decide the ranking.

★Depending upon combination of entrants to a heat, sometimes only 2 or 3 people can contend. Even in such a case, the points of the first place are awarded.

★When the total points of all the heats tie the score, a playoff will be held. When contestants using the same frequency should end in a draw, the winner is chosen by comparing the rankings of each heat, or else they are made to vie for superiority by running one by one for time.

●TIME RACE

Time required at each heat is recorded, and the ranking is determined by the total time. Sometimes the point system is used together with time to get the result more distinctly.

●LAP RACE

One who makes the most number of laps on the course in a given time is the winner. This method is often employed for long distance endurance contests. A notable common feature through point system, time and round races is that entrants have to be classified under a frequency to use. Because participants using the same frequency will be never contend at the same time under any circumstances, the final ranking is not necessarily reflected with their real ability of controlling models. This is something which cannot be helped so long as the frequencies are restricted to a limited number. However, the problem can be solved to some extent by arranging races in a series form or assorted with the time race system.

10. PENALTY POINTS

A participant should be penalized when he conducts himself against the spirit of fair play or against the smooth progress of a contest. The punishment is disqualification and then imposition of a cut in marks or additional penalty time.

★It is usual that interference to other cars and remodelling exceeding the limit should be liable to disqualification.

★A breakaway is subject to demerit mark. The penalty system should be constituted from the standard of annoyance to other participants or injustice among the entrants.

11. TROUBLE

When a model gets out of order in the midst of a race and is unable to proceed or out of control, all cars in the race should start again or the car alone should be retired.

●RESTARTING

In case the cars go out of control by radio interference, or the race is obstructed by spectators or somebody else, restarting will be done.

●RETIREMENT

In case a model cannot proceed in the race due to insufficient previous check up or because of an accident while racing, the said car only must retire from the race.

12. ACCOMMODATION

Ample consideration is desired to be given to conveniences and accommodations in the place of the meeting in order to produce an exciting atmosphere to the race.

●START FLAG
Generally a national flag or a flag of the host organization is in use.

●FINISH FLAG (CHECKER FLAG)
A checker flag of black and white is waved to the winner's car just before and when crossing the finish line.

●SCORE BOARD
To help the race proceedings, a score board is desirable to be installed for announcing the records of each heat and ranking to the public.

●CONTROL STAND
A stand is very convenient to install so that the racers can command the better view of the course and the cars while racing.

●PROPS IN THE COURSE LAYOUT
A bridge made of a tire or advertisement sign boards of companies which can be seen along a real racing track, and miniature guard rails used as pylons in the course will enliven the race.

'84 RC OFF ROAD WORLD CHAMPIONSHIPS, TORONTO, CAN

'83 RC OFF ROAD WORLD CHAMPIONSHIPS, TORONTO, CAN

RC OFF ROAD RACE IN TORONTO, CANADA

RC RACE IN OSNABRÜCK, W. GERMANY

THE CHALLANGE OF LE MANS

LONG DISTANCE AND ENDURANCE RACES

The Le Mans 24 hour race is done with racing sport cars, and the famous Spa-Francorchamps 24 hour race is done with touring type cars. A combination of driving ability and team-work of the pit crew are necessary for winning this type of race. Fuel (batteries); tire changes and the correction or replacement of broken parts is essential from the pit crew in the minimum time possible to remain competitive. A R/C long distance race should be conducted over a period of at least one hour, and the winner is the vehicle that completed the most laps during the period. Recharging batteries, assembling required spares and changes in the steering and gear ratios are only some of the things that might need to be accomplished during the race. Driver fatigue can also be an important consideration during the race, and changes of drivers should be anticipated during a pit stop. The fastest car on the course is not necessarily going to be the winner. The car that maintains the best total average over the entire race is most likely going to win. Prior race planning and completely understanding the limitations of your vehicle, as to battery duration and speeds over the circuit can give you the edge for winning long distance races. The challenges of long distance racing are completely different from those of sprint races.

THE TORTOISE AND THE HARE

●About "Speed" in long distance racing

In any long distance race, you cannot say for certain that the fastest vehicle is going to be the winner. We are all familiar with the saga of the Tortoise and the Hare. The Turtle was far slower than the rabbit, but won the race by keeping a steady pace throughout the course. Maximum acceleration and high top speed are not that necessary in long distance racing. If you have a very high performance car, tuned up to its capacity, and attempt to run a long distance race, you are likely to spin out often if you are initially concerned with leading the pack at the races outset. Fast acceleration and a high top speed utilize a large current flow from the battery, thereby requiring more pit stops for battery changes. Long distance vehicles also require a greater degree of precision tuning, better maintenance, and durable parts, and perhaps a different gear ratio. The vehicle that makes the fewest pit stops will most likely be the winner.

CARS FOR LONG DISTANCE RACES

●Credibility & durability are the first requirement

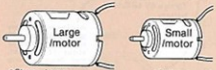
In full sized car racing, the machine used for long distance racing has less high speed performance than a racer for sprints. This is done so that the vehicle will last the entire race, and not become disabled prior to the finish. In radio controlled cars for long distance racing, the same is true. A car made from a kit properly will have this durability and be competitive during the entire race; however, if it is not built and assembled accurately, the chances of it surviving a race is slim. You must make sure that all screws and nuts are tightened firmly and where required, that liquid thread lock is applied to the threads to prevent loosening. It is recommended that all electrical wire splices be soldered, to ensure a good positive electrical contact throughout the race, and that the wiring is tied down firmly to prevent it from becoming entangled in drive gears etc. Prior to the race, use new rubber bands and replace the doubled sided servo tape with fresh tape. A car that is lighter in weight will move faster; however, by lightening the chassis by drilling holes in it, or removing some bracing, you may find you are faster, but the car will not last the race because it is no longer durable. Credibility & Durability are the keys to winning long distance.

●Pit practice and maintenance for victory

The majority of pit work during the race will be battery changes. By saving time during these stops, you can greatly advance your standing in the race. It is very necessary that your crew practice removing the body, change batteries, replace the body and secure it on the chassis. The more this is practiced, the quicker they will be during the race. One second saved in time is a gain of one second on the leader, and races are won and lost in less time than a second. During the race it is necessary to be calm during pit stops. If you are in too much of a hurry you could make mistakes that delay getting back into the race, such as misplacing clip-pins for the body, failure to connect up the battery properly. Practice, and more practice is the key in saving time. Also be prepared to replace motors, wheels and tires during the race. If you use plug type connectors to the motor it can be replaced quickly if necessary. The same is true of the speed controller. Make it easy for your pit crew to keep the car on the track.

●A powerful motor is not always profitable

A large, powerful motor is a necessity in sprint type races where no battery changes are needed; however, the same does not hold true for long distance racing. Small motors which use little electric current are much better as they require fewer pit stops for battery changes. As an example, the Mabuchi RS-540S and RS-380S motors are representative of motors used in radio control racing. The RS-540S has a torque of 200gcm; RPM 11,000 and draws current at 6.25 ampere. The RS-380S on the other hand has a torque of 75gcm, RPM 12,800 and draws 2.9 amperes. This information shows that the RS-540S motor produces more than double the power, but consumes also twice the current. A car using the RS-540S motor will require many more pit stops for battery changes than one using the 380, and even though the car will be somewhat slower on the track, it will still be running while the former is in the pits for battery changes. Another point to consider, is that with the high current flow of the larger motor, the speed controller is more apt to cause trouble, and in any collision, the faster car is normally damaged to a greater extent because of the higher impact forces. A faster car is also more tiring to drive during long races and mistakes in driving are more likely to happen due to the speed at which it is traveling. All of these considerations must be taken into account when selecting a vehicle and motor for long distance racing. A good rule to follow when working up a vehicle for endurance racing is to use a smaller motor for those tracks which have many tight corners and fewer straight runs, and use a higher performance engine with higher gearing for those tracks with long straight runs and less complex curves.



●Strong torque and high top speed and large current drain

●Better current drain with correspondingly less pit stops.

LONG DISTANCE RACING DEPENDS UPON TEAM EFFORT

●Organizing a racing team

You can, of course be the driver, pit crew, and run an entire long distance race by yourself; however, you will not be overly successful very often doing this. Best results are obtained with a driver, mechanic for battery changes, repair and adjustment, time keeper who records and times the laps, and a team manager who guides the team. Long distance racing can require more than one driver, so it is best if all team members are also drivers.

●Team work gives the edge to your car

Once the team is formed, the next step is to get it working together. Firstly, all members must know and practice the role they are to play. The driver must run the car according to the team manager's instructions. It disrupts the team work when a driver struggles against other cars following his own selfish interests, or delays a pit stop etc. The mechanic is constantly preparing the batteries for changing, and keeping track of which are fresh and those in a discharged state. They look the same and in the flurried atmosphere of a race, more than one dead battery has been replaced by another dead one. He should be adept in quickly removing the car body for battery changing, and adjusting steering and changing tires etc. The time keeper plays an important role in-as-much as he records all of the fundamental data that the team manager uses to formulate his race strategy and tactics. At a minimum, he should record the number of laps run and the lapsed time from the beginning of the race. If possible, he should calculate the average lap time of the team's vehicle, time the pit stop and record what was done, plus keep track of who was driving and when a change of drivers occured. The team manager observes the progress of the other teams, and advises his driver as to pacing, pit stops etc. The team manager and time keeper should not be drivers in this race. During the second half of the race, when there is almost no difference between your car and the rivals team, it is the data provided by the time keeper that will give the team manager the necessary information to guide his driver on to victory. It is the manager who is responsible for victory or defeat in long distance races.

●Periodic pit stop maintenance

The number of pit stops made must be reduced to the absolute minimum. If your

only stops are for battery changes and/or driver change, then your race is progressing well. Keep in mind though, that it is also necessary to periodically oil bearings, and shafts. Polish and oil speed controllers, and to apply spray oil into motors and onto gears. This maintenance, although time consuming during a pit stop, must be done to prevent failure of a part due to lack of lubrication. Also look for any loosening screws and/or missing parts that may require maintenance during the next stop.

● Trouble pit stops

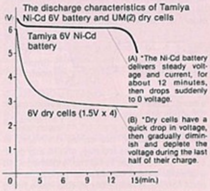
As soon as a problem is noticed by the driver, he should pit the vehicle the next lap. To keep running the car with a problem will only create a worse problem, and perhaps one that can no longer be repaired during the race. After a bad collision or spin out, observe the vehicle for a lap or so, and if there is a problem pit it as soon as possible. During the latter stages of a race, it is difficult to judge if your vehicle is performing the same as at the beginning. You must compare your performance with your rivals, and if your vehicles running compares favorably with your opponent, keep running it, even though you feel that its performance is not as good as at the beginning. If you make a stop and discover that it will take too long to repair the fault, continue running the vehicle, rather than expending the repair time. The managers judgement on this must be accepted.

● Pit tools and spare parts

Keep the total number of tools in the pit to a minimum; however, make sure that you have all of the required tools to completely assemble the vehicle. A box wrench, for instance, is much better than an adjustable spanner. Needlenose pliers and tweezers are also required. If you take only one glue, the instant cyanoacrylate is recommended. Gummed tape, vinyl tape and soft iron wire are also very useful for making emergency repairs. Take along enough parts to completely rebuild the vehicle. Extra parts for the front-end and steering, and those parts that require assembly, should be assembled prior to the race, so that they can be installed as a unit, rather than part by part during a pit stop. Sponge type tires do not normally require replacement in races of two hours or under. Semi-pneumatic tires will require replacement two or three times. As for diplo tires, if the center rubber part of the tire is not firmly fastened, it may come off during the race. Wheels sometimes become broken, so even if you are using sponge tires, take along spare wheels on which you have mounted new tires, properly balanced and rounded off. Be prepared for anything that could likely occur. If you don't bring it, that's what will break during the race.

● BATTERY CHANGING DURING RACES

One very important, (perhaps the most important) part of racing, is how long your batteries will last during a given time. Ni-Cd batteries have the ability to deliver a constant even voltage and current supply to the motor, until the battery is almost exhausted. If you are familiar with the circuit you will be racing upon, you already know how many laps you can get from your battery on that circuit, however, if you are racing on a different circuit, it will be guess work on your part to know how many laps you will get from battery. During endurance racing, where many battery changes are required, you must have the ability to judge when a pit stop for battery changing is necessary. Normally, you will bring the car into the pits about two or three laps prior to battery exhaustion. Running the car until it stops from lack of power is not good for the battery, nor will you end up winning any races that way. Tires, driving technique, course length, number of laps required, course condition, type of motor, all play a part in how long a battery will last. Be on the safe side and bring your car into the pits after you have run the battery down to its safe limit, by measuring the time or laps run. Make sure that your battery supply for the race is sufficient for the entire race, to include two or three extra batteries, for protection in case of an accident on the track, or battery malfunction. The smooth, steady driver, who makes the required pit stops on time, is the driver who will win endurance racing.



● RADIO CONTROL BATTERY LIFE

Normally, you will not require a fresh receiver or transmitter battery during a race that is not longer than one hour, if you start the race with fresh batteries or recharged Ni-Cds. Note however, that the more servos you use, the more the receiver battery is used. Whatever equipment you use, you must be familiar with the nominal life expectancy of the batteries, and if there is a possibility of the race lasting longer than expected, prepare extra batteries beforehand, just in case they are needed at a pit stop.

TECHNIQUES FOR WINNING LONG DISTANCE RACES

Endurance or long distance races are very much like human distance racing. To win, you must establish and keep a steady pace throughout the race, avoiding useless deadheats with other rivals at all times. Keep clear of trouble on the track and run your car at a steady even pace.

● Start

You do not have to "Jack Rabbit" start. Take it easy and run carefully at the beginning, especially at the first corner, where accidents often occur. Enter the corner high, even if you are left behind at this curve. Accidents at the beginning of the race often leave the driver irritated and confused, and the original plan of pacing is lost. For the first two or three laps be very deliberate in your driving. You will start to relax, learn the track and how the others are pacing themselves. If you should spin out, don't become upset and dash to catch up. Keep the pace and drive smoothly.

● How to pass and get ahead of rivals

Success in long distance racing usually comes from not being in the lead for most of the race. When you are the front runner, you are always concerned about those who are behind you trying to pass. If you cannot maintain enough distance in the lead over your rivals, it is better to let one or two pass you, than constantly worrying about them. You can then use the leader as a pace setter for you, and when the time comes for you to pass, do it right after a corner that is followed by a long straightaway. Even if your car seems to be slower than others in the race, you still have a good chance of winning. Remember that the faster a car runs, the more battery it consumes, and the faster cars will have to make more pit stops. This is your chance to catch up and pass them. If you can just manage to keep your own pace, throughout the race, you have a good chance for the winner's trophy.

● RELAX WHEN CORNERING!

During the endurance races, take the middle or high corner, rather than at the track inside edge. This is where many accidents occur, and those that are trying to catch up from their last spin out will be fighting for that inside lane, and most likely spin out again. If you are there, you could be knocked out in the accident. Stay high in the corner and relax, except for that time when you need the extra speed and dash for winning the race. Relax and win!

RECORD THE RACE

In long distance races, it is advisable t keep a record of the race. Later, you will b able to review it with your team mates and determine where time was lost. This is very useful and positive approach to im prove and strengthen your team for othe long races.

● Pit records

This is the record of all pit stops of you car. Which laps the stops occurred, ho long the stop was for. The reasons for th stop and what was done to the vehicle a each stop. Perhaps you only change drivers and batteries, or perhaps change tires due to new track conditions (rain; o on track etc.). Whatever the reason, this in formation will assist you in making a bette overall plan for the next long distance race

● Race progress records

This is a record of the progress of the race lap by lap. It will consist of the lap times driver's name and any other informatio deemed necessary during the actual runn ing of the car in the race. This informatio will provide you with planning data fo future races as to which driver is best fo certain conditions; number of laps expect ed during an hour of driving time; and number of pit stops expected.

● Lap record listing

This is the data which the promoter of th race records. The number of laps of eac team is recorded every 5 minutes. Fro this record, the pace of each team is dete mined, and the progress of the race. He wi know which car is ahead and also whe another car takes the lead from a rival.

OFF ROAD DRIVING CARE

OVER RUNNING YOUR CAR CAN CAUSE MISHAPS AND PROBLEMS

Even though you own an off-road vehicle, you must select your driving areas with care to keep your vehicle in good condition. Inconsiderate driving will cause trouble and possible damage to your car.

1. UNSUITABLE DRIVING SURFACES

● DRY RIVER BED

A dry river bed where many large rocks are found is perhaps the worst place for driving an off roader. In 1/10 scale, even a stone with a 10cm dia is the same as a 10 meter dia boulder in real life. Driving against these objects is like intentionally destroying your vehicle.

Driving in a dry river bed can damage the car.

● GRASSLAND

Grasslands with tall grass and stems are bad for buggies because the grass can become entangled in the rear shafts and universal joints, which cause an unnecessary load on the motor which can cause overheating.

Note: grass can become entangled in rear shafts.

2. SURFACE THAT REQUIRE SPECIAL HANDLING

● ASPHALT AND LAWNS

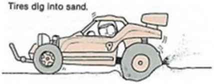
Highspeed cornering on concrete, asphalt or smooth lawns will cause the vehicle to roll. Slow down a little when cornering on these surfaces.

Do cornering on pavement at lower speeds.

3. DIFFICULT SURFACES

● GRAVEL AND DRY SAND

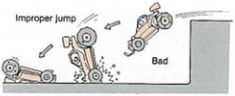
These surfaces offer considerable resistance to your vehicle. There is a burden on the motor and it will use much more current. The vehicle will not move as fast on this type of terrain, and on loose dry sand the tire can become buried and spin, without moving the car.


Tires dig into sand.

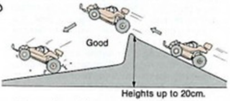
4. JUMPS

Dynamic jumping is a part of off road driving; however, your car can damage your car if you do it recklessly. A jump must be done so that the rear wheels land first with the vehicle level. In order for it to be in a level/slightly nose high attitude, you must leave the ramp squarely and not enter it from an angle. If you do not do this, the car will tend to tumble while it is in the air and land off balance. Your jumping ramp can be up to 20cm in height for safe, smooth jumps.

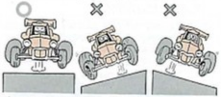
Improper jump



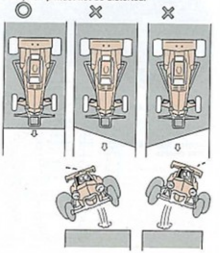
Good ramp: good jumping style.



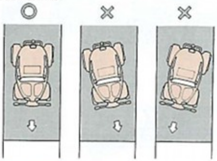
Upper surface of jump ramp is level.



Jump ramp must not be distorted.



Straight jump!



5. WATER AND PONDS

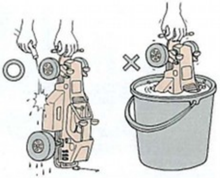
Although the rough rider and sand scorcher, plus others are water resistant, water can enter the mechanism box due to water pressure if the car is allowed in deep water. The safe depth of the water hazard is up to the lower edge of the wheels.

Note depth of pool. Depth is allowed up to wheel.

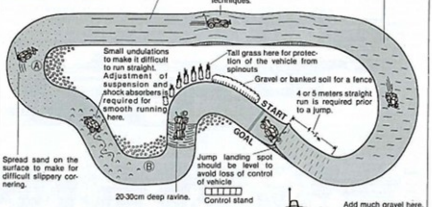
6. CARE IN WASHING THE CAR

Cars with water resistant mechanics boxes can be washed down with a hose if they are dirty. Hold the vehicle by the front bumper and let it hang down vertically while cleaning off with the hose. Do not dip the car into a bucket of water because the pressure will allow water to enter into the box through the vent holes. For a thorough cleaning, it is best to remove the mechanics box entirely, then immersion in water will not harm the radio gear.

*After running the vehicle through water, or after washing, it is a good idea to open up the mechanics box and wipe out any moisture that may have been induced, then dry it in an airy place. Disassemble the gearbox and oil the gears, bearings and suspension.



TYPICAL OFF ROAD TRACK


A straight run for acceleration.
Gentle climbs and descents for added driving techniques.
High speed corners must be a little wider here
Small undulations to make it difficult to run straight. Adjustment of suspension and shock absorbers is required for smooth running here.
Tall grass here for protection of the vehicle from spinouts
Gravel or banked soil for a fence
4 or 5 meters straight run is required prior to a jump.
START
GOAL
Ⓐ
Ⓑ
Spread sand on the surface to make for difficult slippery cornering.
Jump landing spot should be level to avoid loss of control of vehicle
20-30cm deep ravine.
Control stand

Add much gravel here.

Ⓐ, Ⓑ Points
Put a lot of gravel on the inside of corners to prevent car from cutting corner.

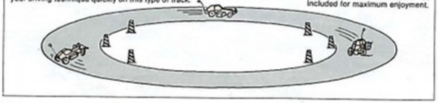
High speed, full counter steering course

★The most difficult driving areas should be placed near the control stand.

★If possible, a shallow pond or muddy areas should also be included for maximum enjoyment.

OVAL DIRT COURSE

An oval dirt course can be set up on school grounds and parks. Although it is simple you can improve your driving technique quickly on this type of track.



HINTS IN BUILDING UP 4X4 VEHICLES

Tamiya's R/C 4WD vehicles offers you the unique enjoyment of working with 4 wheel drive mechanics, and they are very much suited to experienced drivers as well as beginners. Since the radio system is located in a sealed compartment, you can utilize the vehicles for heavy duty driving in all climates.

FOR THOSE JUST GETTING INTO 4X4 VEHICLES

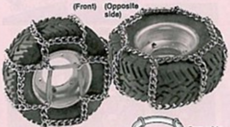
Tamiya's R/C 4WD vehicles are best matched with a 4 channel, 3 servo radio system. There are many radio systems on the market that can be utilized and are very reasonably priced. Use a 4 channel system for maximum flexibility with your Tamiya 4X4's.

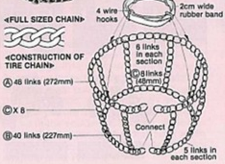
FOR THOSE WHO ALREADY POSSESS A 2 CHANNEL RADIO SYSTEM.

If you already own a 2 channel system and purchase a Tamiya 4X4, you can gain experience with it by installing your present system. Although you cannot shift the gears with the radio, you can still enjoy very powerful driving. When you get bored with the inability to shift gears, then it's time to go out and purchase a 4 channel set. You will have the same enjoyment with your 4X4 using a 2 channel radio, as with any of the regular 2 channel R/C cars; however, maximum enjoyment comes with the ability to shift gears with the radio.

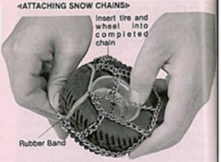
HOW TO MAKE SNOW CHAINS

4 wheel drive vehicles can be effective in snow; however, for more positive traction snow chains are suggested. These are easy to construct using small linked chains found at hobby and do-it-yourself shops. Referrin to the full sized figures and photos, fabricat a snow chain as shown. Add the four hook and attach the rubber band. To put it onto th wheel, stretch the rubber band and insert th tire and wheel. Adjust the chain as shown Length of the chain shown is for the Toyot Hi-lux 4X4. By shortening the chain, it can b used for the 4X4 Blazing Blazer. For bes results, the chains are suggested for the re wheels only.





◀ATTACHING SNOW CHAINS▶



TOYOTA 4x4 PICKUP ON SNOW

Challenge snow driving with rear tire sno chains. Of course the R/C Toyota pickup, can n move in deep fresh snow, but runs easily o 2cm~3cm fallen snow. Enjoy 4x4's on skiin slopes.

Above, Toyota 4x4 pickup pulling a grown-up skate board. Below, 14 Tamiya R/C 4x4 picku can pull a real Toyota 4x4 pickup.

HOW TO BUILD A CIRCUIT

1. POINTS IN DESIGNING A RACING CIRCUIT

Building a racing course, even a simple one, lets you enjoy it far better than running a car in a large open space freely. You can make one very easily, i.e., by drawing lines with chalk or using empty bottles for pylons (when using a space of someone's possession, like a parking lot; of course, permission should be acquired beforehand). To make races more fun, some knowledge of courses are required.

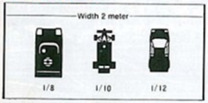
2. A TRACK BEFITTING THE CARS

You cannot expect a thrill of excitement in running cars along a too wide circuit. In a too narrow track, you cannot enjoy speedy driving. The maximum speed of 1/12 electric R/C cars is around 30 km/h and the width of the car body is about 20 centimeters. Based upon these figures, the following designing data will be introduced:

★The length of a course is 100-150 meters.
★The width of the course is 3-4 meters.
★The length of a straight way section is over 30 meters.

The maximum speed of 30 km/h comes to a little over 8 meters per second. Taking the slow down at corners into consideration, the car will make a round of a 150 meters long circuit in about 15 seconds. In the Tamiya Circuit, a round of the longest course out of the possible selections measures about 140 meters. A race is held by making three rounds. The average time required is approximately one minute. This is a rather long time to a racer, as he has to apply all his energies in the control of his car.

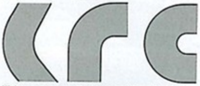
• COMPARISON OF 2 METER WIDE COURSE AND MODEL CARS



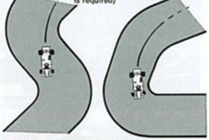
The width of the road should be desinged from the size (breadth) of the models. The 1/12 cars are 20 centimeters wide. So having 10 centimeters in between cars, then 2.5 meters of width is required for 8 racing cars. If a way should be established in that all cars do not start from the starting line in a row, a narrower width of the course would be permissible. But for avoiding collisions and bumping while passing each other, the breadth of over 2 meters 50 centimeters is desirable. The Tamiya Circuit is 4 meters wide (sometimes 3 meters), but still it does not look too broad. There should be at least one portion of a straight line in a course where cars are allowed to run at their maximum speed. The longest straight in the Tamiya Circuit is 42 meters long. 1/12 electric cars can cover this length in 5 seconds or so. Here, on this straight, the racer can take a breather. A longer straight course, depending on cars' ability, may be desirable. A drag race can be held in a straight of over 40 meters to contend for 0-400 meter pick-up performance (converted in 1/12, it should be about 33.4 meters.)

3. TRACK CHARACTERISTICS ARE DETERMINED BY CURVES

• KIND AND CHARACTERISTICS OF CURVES

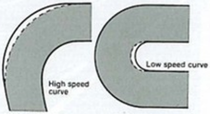


High speed curve = Cars can pass through at high speed (challenging running)
Medium speed curve = Some slow down is called for (this is where passing is done. Many car will be spinning and leave the course)
Low speed curve = Hair pin curve (prudent running is required)

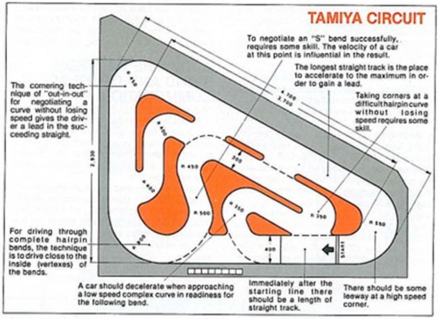


• COMPLEX CURVE - SUCCESSION OF MULTIPLE CURVES

Try to anticipate the course ahead.
Watch for places to pass skidding opponents.



●Wider outside curve
●Wider inside curve



TAMIYA CIRCUIT

To negotiate an "S" bend successfully, requires some skill. The velocity of a car at this point is influential in the result.

The longest straight track is the place to accelerate to the maximum in order to gain a lead.

Taking corners at a difficult hairpin curve without losing speed requires some skill.

The cornering technique of "out-in-out" for negotiating a curve without losing speed gives the driver a lead in the succeeding straight.

For driving through complete hairpin bends, the technique is to drive close to the inside (vertexes) of the bends.

A car should decelerate when approaching a low speed complex curve in readiness for the following bend.

Immediately after the starting line there should be a length of straight track.

There should be some leeway at a high speed corner.

Circuits are roughly classified in two groups; a high speed course where velocity is important, and a low speed course where control techniques are more important. The features of a track are formed with the number and characteristics of many curves. An ideal circuit conceivable is a mixture of high and low speed courses for 1/12 electric model cars which boast of excellent maneuverability due to the differential gear device equipped.

★Assorted curves should be incorporated.
★Vertexes of curves should be made with some bluntness.

Curves can be divided in three groups in terms of passing speed: High speed curve which a car can go through with almost no deceleration, medium speed curve where some slow down is required, and low speed curve. And in terms of layout, a simple curve is one built with a single radius, and a complex curve consists of multiple radii. Straights between curves are also influential. With all these features being incorporated, quite a challenging circuit can be made with curves of different characteristics.

Please refer to the illustration of the Tamiya Circuit and the drawing left for the individual feature of curves. Also, note the point of vertexes are made not too sharp. According to the data gathered at the Tamiya Circuit, cars are apt to deviate from the course towards the outside at high speed curves and inside at low speed curves. The road surface of the curves have been modified accordingly.

4. FROM A DRIVER'S VIEW POINT

The biggest difference between the real car and the radio controlled model is, of course, the position of drivers. Hence, the following hints have been brought about:

★Portion of a circuit away from the drivers should be made broader.
★Complex course layout is not to be built away from the drivers.
★A circuit is to be designed with consideration from the driver's vision.

The farther away from the driver, the narrower the course looks because of parallax. It could be some problem to drivers. To compensate for this, this particular portion of a circuit should be widened. In case of the Tamiya Circuit, the opposite side of the track to the driver's stand is 4 meters wide. One meter wider than the near side. For the same reason, it is not recommended to design a course with complex curves where meticulous controlling is required a distance away from the driver. Some bridges and gates on the circuit are very useful auxiliary articles to make the circuit lifelike; however, again, attention must be paid not to block the view of curves from the driver's sight.

5. TO MAKE A RACE MORE ENJOYABLE

Most of the electric cars have the same or similar performance, so there is a likelihood that they could collide if there is a sharp curve right after the start of a race. Therefore, it is recommended that some length of straight running be available just after starting. It is not necessary to have the circuit at one level. On the contrary, some undulation and a leaping slope or two may be useful to add to the course more variety and making the race more enjoyable, unless these objects would hide the car from their vision.

6. TRACK SURFACE AND COURSE SIDE

★The pavement of the track need not be very smooth.
★Drainage is important.
★Lawn is ideal for course side.

Pavement of simple surfacing asphalt is

adequate without a firm foundation. Or a Sunday chore by the club members to lay concrete surface may suffice for the purpose. Some uneveness and slope will not be a cause of trouble, but drainage should be planned carefully.

Shortly mowed lawn on the side space of the course is ideal when considering deviation of cars from the track. However, it would call for time and care to grow. On the Tamiya Circuit, natural turf is employed on the space between the roads, and outside spaces are kept as dirt surfaces. In cases of dirt surface, all the pebbles should properly be picked up and the surface tamped down. Also, tall grass and leaves must be disposed of since they might jam into a shaft of the car.

The joint of the track and the side space may be built on one level or in a gentle slope, the outside being high, if there should be any rise and fall between surface levels, in order to allow a car that deviated to get back to the course with ease. When the space between courses is very narrow, some device may be needed to keep a car from jumping into the next course.

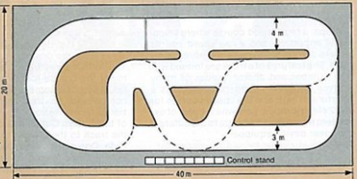
7. DRIVERS CONTROL STAND AND OTHER ACCOMMODATION

The larger a circuit is, the taller the control stand must be. The Tamiya Circuit has a control stand of 1.20 meters high. However, when a stand is too high, it would be inconvenient to step up and down. Sometimes a hand rail, for safety's sake, may be necessary.

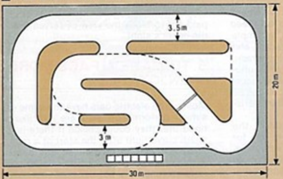
Besides bridges and gates on the circuit, a signal light for starting, a control tower, sign boards of sponsors, and things like that are desirable so as to boost up the atmosphere; hints of such auxiliary props can be obtained in car and racing magazines.

VARIOUS PLANS OF CIRCUIT LAYOUT

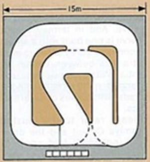
1 LARGE CIRCUIT



2 HIGH SPEED TECHNICAL CIRCUIT

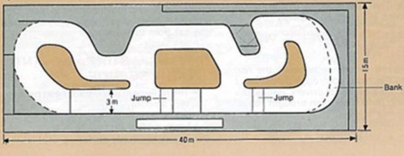


3 SQUARE



Width of course over 2 meters

4 TAMIYA OFF ROAD CIRCUIT

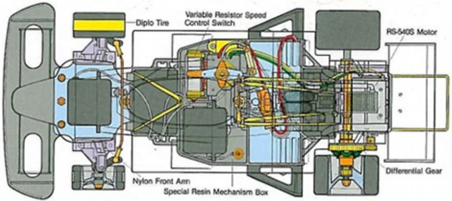


RC CIRCUIT IN DENMARK

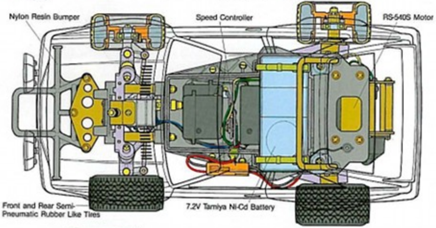
RC CIRCUIT IN SINGAPORE

RC CIRCUIT IN SPAIN

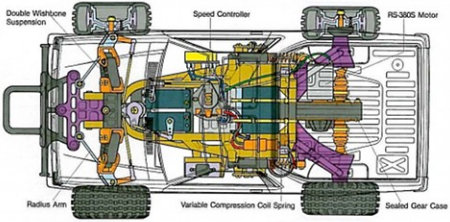
TAMIYA CIRCUIT IN JAPAN

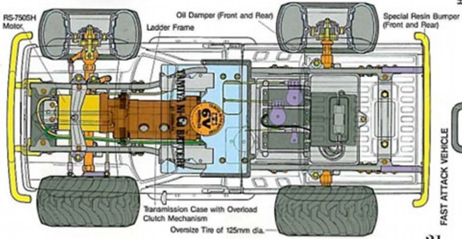

HONDA F-2 (COMPETITION SPECIAL)

Diplo Tire
Variable Resistor Speed Control Switch
RS-540S Motor
Nylon Front Arm
Special Resin Mechanism Box
Differential Gear

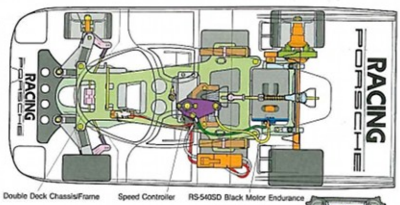

AUDI QUATTRO RALLY

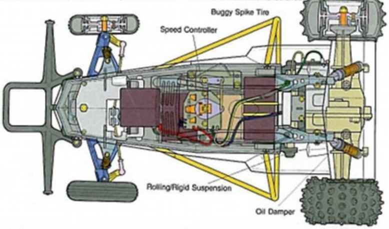
Nylon Resin Bumper
Speed Controller
RS-540S Motor
Front and Rear Semi-Pneumatic Rubber Like Tires
7.2V Tamiya Ni-Cd Battery

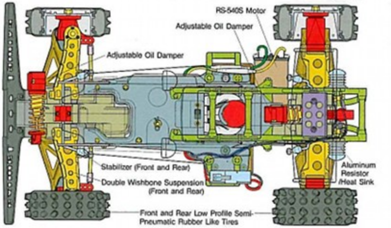

SUBARU BRAT


TOYOTA 4×4 PICKUP BRUISER

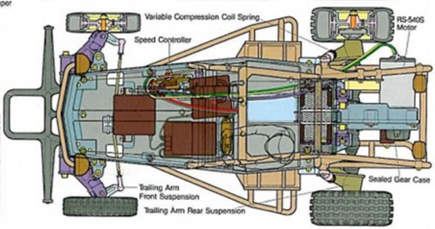
RS-750SH Motor
Ladder Frame
Oil Damper (Front and Rear)
Special Resin Bumper (Front and Rear)
TAMIYA Ni-Cd BATTERY
6V
Transmission Case with Overload Clutch Mechanism
Oversize Tire of 125mm dia.


PORSCHE 956 RACING MASTER Mk.5


THE HORNET


HOTSHOT 4WD

RS-540S Motor
Adjustable Oil Damper
Adjustable Oil Damper
Stabilizer (Front and Rear)
Double Wishbone Suspension (Front and Rear)
Aluminum Resistor /Heat Sink
Front and Rear Low Profile Semi-Pneumatic Rubber Like Tires


FAST ATTACK VEHICLE

Variable Compression Coil Spring
Speed Controller
RS-540S Motor
Sealed Gear Case
Trailing Arm Front Suspension
Trailing Arm Rear Suspension

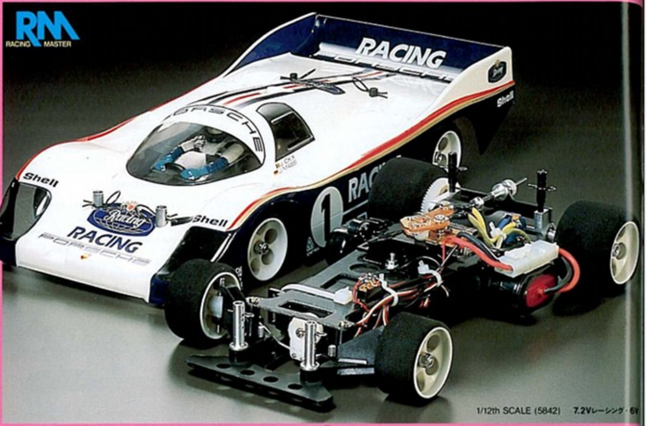
42 PORSCHE 956 RM. Mk.5

ポルシェ956 レーシングマスター Mk.5

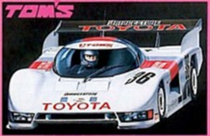
This high performance Porsche 956 R/C model was developed for racing competition. It is a three point suspension vehicle with a front independent suspension using coil springs for damping, and the rear suspension is a single point adjustable swing unit, newly designed for competition. Adjustable stabilizer bar adapts this racer to any track conditions. Frame is lightweight FRP of the double deck type. Flat coil speed control is adjustable for soft and hard braking, and uses a positive contact wiper. It is the fastest R/C car Tamiya has yet designed.

About the prototype. ● The Porsche 956 is a group C racing vehicle developed for the World Endurance Championships. Its aerodynamic body with a refined ground effect undersurface uses a 2649cc opposed six cylinder turbocharged engine of 600 hp. It has won, to date, both the 1982, 83 and 84 championships.

(Model Specifications) ● Scale: 1/12 ● Overall length: 377mm ● Overall width: 170mm ● Overall height: 82mm ● Weight fully equipped: 950g ● Wheelbase: 203mm ● Tread: Front/rear 135mm ● Tire diameter/width: Front 48/25mm, rear 53/35mm ● Body: Polycarbonate ● Front independent suspension using coil springs for damping ● Stabilizer bar for rear sway adjustments ● Motor: RS-540SD Black Motor Endurance ● Gear ratios: 1/3.1, 1/3.44, 1/3.65, 1/3.88 ● Power source: Tamiya 6V1200mAh Ni-Cd or 7.2V racing pack Ni-Cd ● Speed control: Forward variable, reverse one step. Variable braking ● Radio Control unit: 2 channel, 2 servo required. Radio and batteries not in kit.



1/12th SCALE (5842) **7.2Vレーシング・6V**



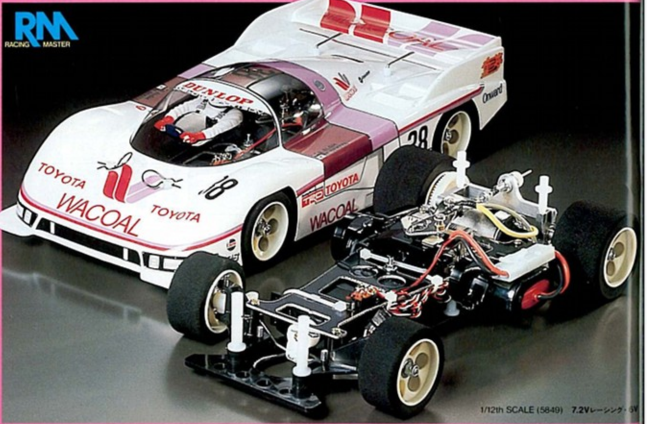
49 TOYOTA TOM'S 84C RM. Mk.6

トヨタトムス84C レーシングマスター Mk.6

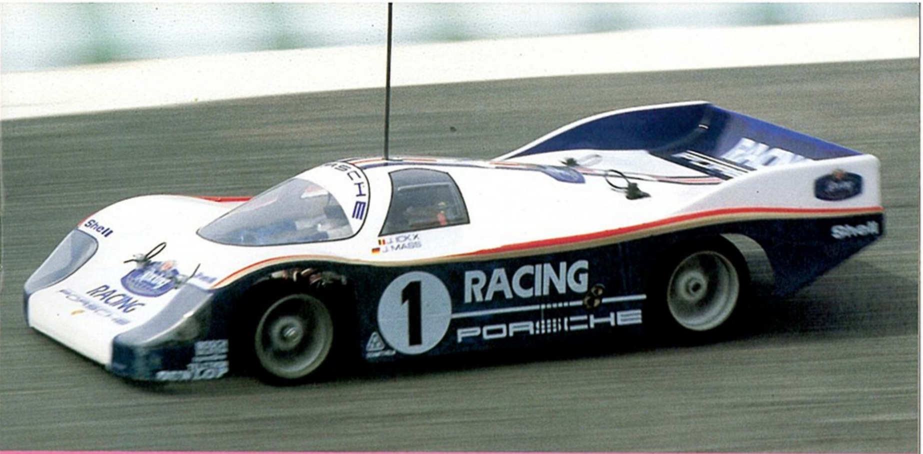
A group C Endurance racer that can lead the pack. It uses a sophisticated 3 point suspension system with front coil springing for positive and stable control on all tracks. The one point rear swing adjustment is easily accomplished for differing road conditions. This model utilizes the same basic chassis as the Porsche 956 Racing Master Mk.5, and the vehicle was engineered for winning. The aerodynamic styling of Toyota Tom's body is functional, as well as pleasing, and its performance will delight those who race with it.

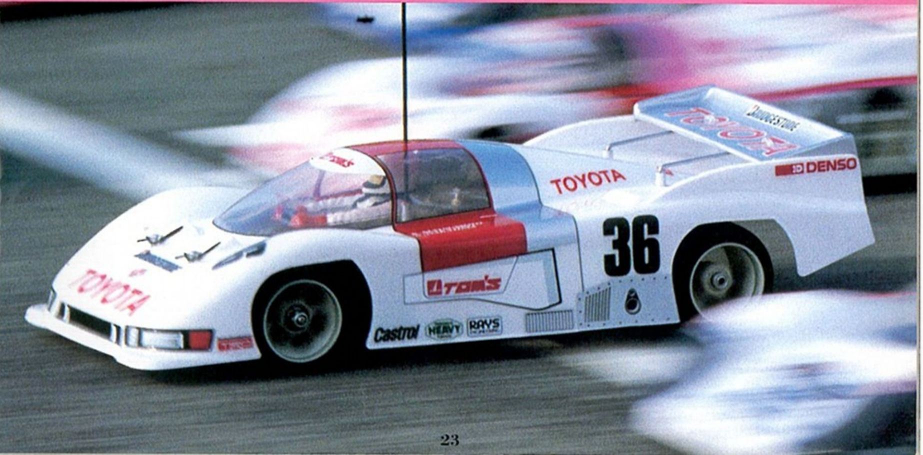
About the prototype ● Toyota Tom's 84C took a 7th place at the World Endurance Championships held at the Fuji Speedway, Japan in 1984. The first five places were taken up by the well known Porsche 956. It utilizes a modified Toyota 4T-GT turbo engine which produces over 500hp, and it is expected to be a formidable rival.

(Model Specifications) ● Scale: 1/12 ● Overall length: 358mm ● Overall width: 170mm ● Overall height: 80mm ● Wheelbase: 203mm ● Tread: Front/rear 135mm ● Tire diameter/width: Front 48/25mm, rear 53/35mm ● Weight fully equipped: 970g ● Body: Polycarbonate ● Frame: Double deck type of FRP ● Suspension: Front independent using coils, rear rigid swing arm with stabilizer. ● Motor: RS-540S ● Gear ratios: 1/3.1, 1/3.88 ● Speed control: Forward variable, reverse one step. Variable braking ● Power source: Tamiya 7.2V racing pack (not in kit) ● Radio control requirements: 2 channel, 2 servo (Not in kit)



1/12th SCALE (5849) **7.2Vレーシング・6V**





HONDA F-2
1/10th SCALE RADIO CONTROL RACING CAR COMPETITION SPECIAL
Powered by HONDA
16

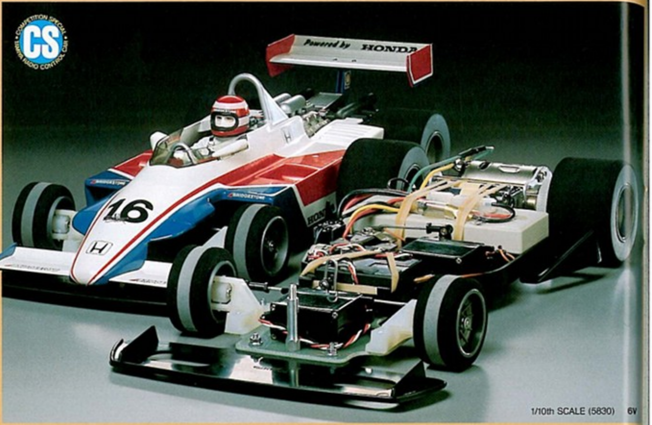
30 HONDA F-2 (COMPETITION SPECIAL)

ホンダF・2《競技用スペシャル》

The Honda motor company is again in the topic of track racing in Japan and Europe. This kit reproduceds a model with performance like the prototype. Chassis is composed of 2mm thick FRP and a mechanism deck of a tough resin. The RS-540S motor and the new three gear differential, has great durability and extreme stability. Front diplo tires and rear sponge tires provide excellent control and maneuverability. This is an ideal kit for those just getting into the hobby of R/C.

About the prototype ● We can say that 1981 was a Honda year in F-2 racing. F-2 machines that mounted the Honda V-type 6 cylinder engines did extremely well. In Europe, the RH 6 Honda won 4 victories with M. Thackwell and G. Lees at the wheel. In Japan S. Nakajima won 2 victories with the March 812 Honda.

(Model Specifications) ● Scale: 1/10 ● Overall length: 438mm ● Overall width: 192mm ● Overall height: 100mm ● Wheelbase 240mm ● Tread: Front 150mm, Rear 140mm ● Minimum ground clearance: 8mm ● Weight fully equipped: 1.2kg ● Tires: Front diplo tire, Rear sponge tire ● Tire width/diameter: Front 24/50, Rear 40/62 ● Body: High impact styrol ● Frame: ABS mechanism deck, center pivot type 2mm thick FRP ● Motor: Mabuchi RS-540S ● Gear ratio: 1/2.8, 1/3.1, 1/3.7 ● Power source: Tamiya 6V Ni-Cd battery (not included) ● Speed control: Forward/reverse stepless variable speed with braking circuit ● Radio control unit: 2 channels digital proportional (not included)



1/10th SCALE (5830) 6V

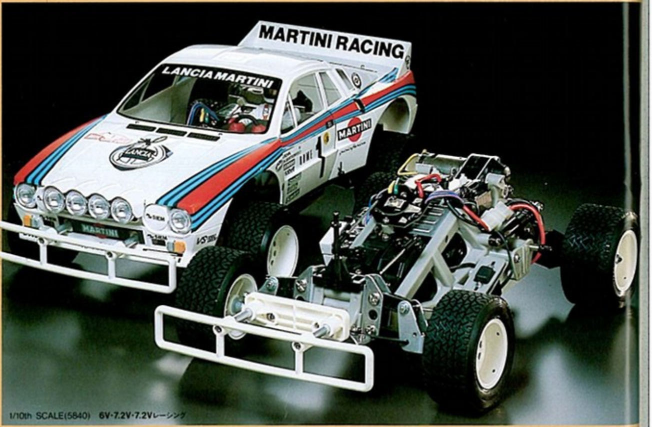
40 LANCIA RALLY

ランチア・ラリー

This action model is ideally suited for beginners and advanced R/C enthusiasts alike. The sophisticated space frame of ABS resin is light in weight and very strong. The double wishbone front independent suspension and rear trailing arm provide the necessary damping of road shocks for smooth running on all surfaces. Includes the powerful RS-380S motor, which can be upgraded to the competition RS540 at any time. Kit will accept many of the high performance tune up parts available.

About the prototype ● This vehicle was developed by Lancia for the World Rally Championships conducted in Europe. Powered by a 2 liter DOHC engine of 350hp mounted amidship, the car took 1st and 2nd places during the Monte Carlo Rally in 1983.

(Model Specifications) ● Scale: 1/10 ● Overall length: 426mm ● Overall width: 236mm ● Overall height: 153mm ● Wheelbase: 248mm ● Tread: Front 197mm, rear 182mm ● Minimum ground clearance: 28mm ● Weight fully equipped: about 1.9kg ● Tire width/diameter: Front 37/78mm, rear 43/78mm ● Body: High impact styrol ● Frame: ABS resin space frame ● Suspension: Front/double wishbone, rear/trailing arm ● Sealed gear case ● Motor: Mabuchi RS-380S (RS-540 optional) ● Gear ratio: 1/12 (380S), 1/6 (540) ● Power source: Tamiya Ni-Cd 6V/7.2V standard battery or Ni-Cd racing pack ● Speed control: Forward/reverse 3 step ● 2 channel, 2 servo radio control required. (Batteries and radio unit not in kit.)



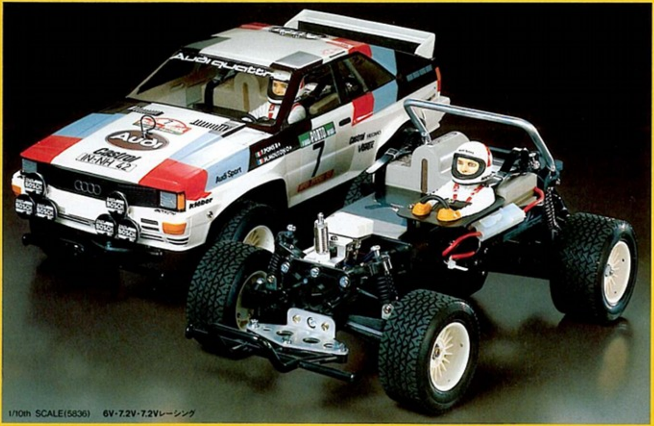
1/10th SCALE(5840) 6V·7.2V·7.2Vレーシング

36 AUDI QUATTRO RALLY

アウディ・クアットロ・ラリー

Now, a scale R/C rally car that can withstand the rigors of rally type racing on all terrain and win for you. The sealed mechanism box protects the R/C equipment from moisture and dust damage. Scaled after the winning 1982 Audi Quattro 4X4 that has become famous all over the world. The special tough plastic chassis is light in weight and strong enough for the most grueling of events. Long wheelbase and low center of gravity provides the stability necessary for these events.

(Model Specifications) ● Scale: 1/10 ● Overall length: 415mm ● Overall height: 155mm ● Overall width: 230mm ● Wheelbase: 215mm ● Tread: Front 167mm, rear 188mm ● Weight fully equipped: 2kg ● Body: Polycarbonate ● Suspension: Front swign axle, Rear trailing link ● All four wheels are ball bearing supported ● High performance differential gears ● Motor: Mabuchi RS540S ● Power source: Tamiya 6V or 7.2V Ni-Cd battery (not included in kit) ● 2 channel, 2 servo radio control unit required. (not in kit)



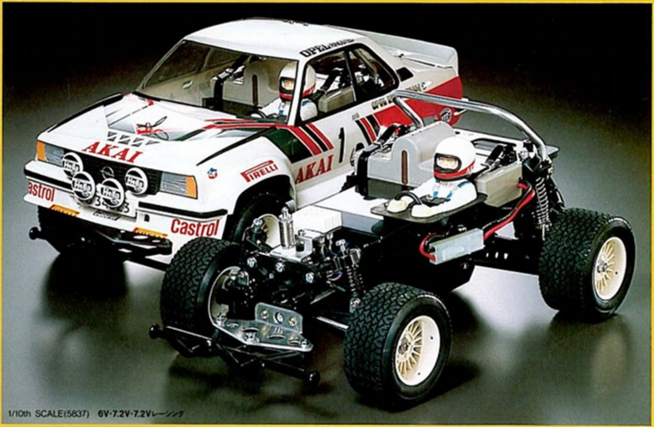
37 OPEL ASCONA400 RALLY

オペル・アスコナ400・ラリー

This is a dual purpose R/C vehicle designed for fun on all road surfaces. Chassis/frame is a sealed box made from durable resin. Water resistant mechanism box protects your R/C equipment and batteries from damage. Sophisticated heavy duty differential is housed in a sealed gear case with automatic safety clutch for gear and motor protection. Independent front wheel suspension and rigid rear trailing arm axle damped with adjustable coil spring suspension.

About the prototype ● The Opel Ascona has the normal layout of a 250hp 2.4 liter DOHC engine and rear drive. It has been very active in the European rally races, and the Ascona 400 won the 1983 Safari rally with driver Ari Vatanen at the wheel.

(Model Specifications) ● Scale: 1/10 ● Overall length: 435mm ● Overall width: 230mm ● Overall height: 160mm ● Wheelbase: 215mm ● Tread: Front 167mm, rear 188mm ● Weight fully equipped: about 2.1kg ● Tire width/diameter: front 37/78mm, rear 43/78mm ● Body: Polycarbonate ● Frame ABS resin ● Suspension: Front/swing axle, rear/trailing link ● Suspension arm: Special reinforced resin ● All four wheels are ball bearing supported. ● With differential gear ● Sealed mechanism box ● Motor: Mabuchi RS-540S ● Gear ratio: 1/9.3 ● Power source: Tamiya Ni-Cd 6V/7.2V standard battery or Ni-Cd racing pack ● Speed control: Forward/reverse 3 step ● 2 channel, 2 servo radio control required. (Batteries and radio unit not in kit.)

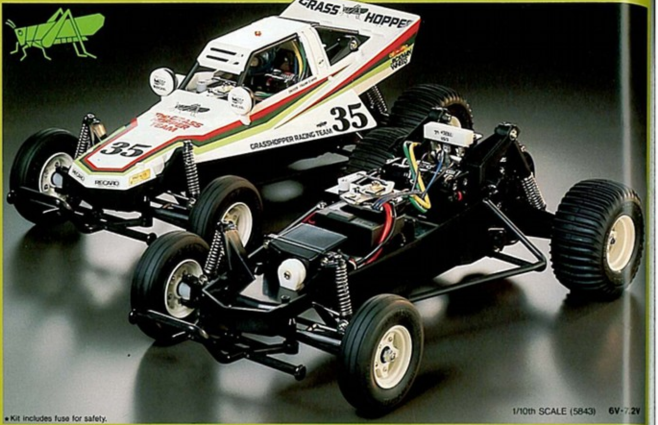


43 The GRASSHOPPER
グラスホッパー

This off road racer is ideally suited for those just getting into the field of R/C modeling. Low in price but high in performance. Includes the popular RS-380S motor for many minutes of exciting driving on each charge of the battery. Sophisticated suspension and heavy duty differential gearing. Can be tuned up with the RS540 motor, ball bearings and oil filled shocks, to provide fantastic performance.

About the prototype ● Real off road vehicles are normally a single seater built on a narrow chassis and powered by a powerful engine. They came into being in the United States and each is individually marked, painted and no two are the same.

(Model Specifications) ● Scale: 1/10 ● Overall length: 389mm ● Overall width: 223mm ● Overall height: 130mm ● Wheelbase: 257mm ● Tread: Front 172mm, Rear 185mm ● Minimum ground clearance: 13mm ● Weight fully equipped: approx. 1400g. ● Tire width/diameter: Front 21/37mm, rear 41/82mm ● Body: Hi impact styrol ● Frame: Bathtub type of ABS resin. Monocoque structure when combined with the body. ● Suspension: Front independent swing axle, Rear, Rigid axle with coil spring damping at all four wheels. ● Sealed gear box with high performance differential Motor: Mabuchi RS-380S (RS540 optional) ● Gear ratio 1/14.7 ● Power source: Tamiya 6V-1200mAh Ni-Cd or 7.2V Ni-Cd. ● Speed control: 3 step forward/reverse. ● Radio Control Unit: 2 channel digital proportional (not included)



★Kit includes fuse for safety.

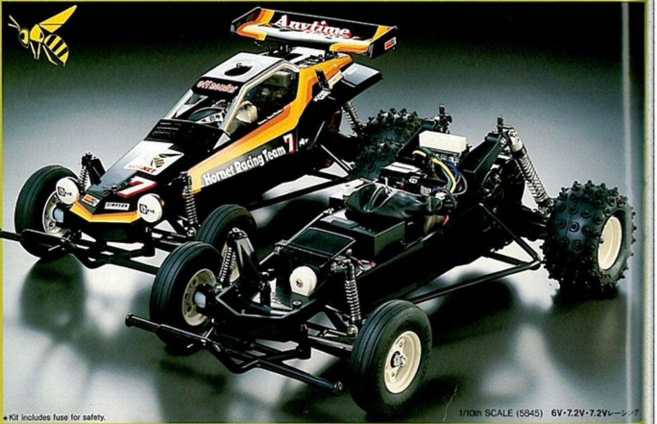
1/10th SCALE (5843) 6V·7.2V

45 THE HORNET
ホーネット

Light weight and high power result in superb performance and the Hornet has achieved this. The use of a tough bathtub frame/chassis of ABS resin, and a rolling/rigid rear axle have kept the weight down to a minimum. A sealed gearbox driven by the famous RS-540S motor provides the power to satisfy beginner and expert alike. With many of the features of the popular Grasshopper, but with the upgrade oil filled shocks and Lexan body, the Hornet is made for the circuits.

In some of the wild and desolate areas of Southern California, buggy racing was born. These fun vehicles are normally of a single seat design constructed from welded steel tubing for lightness and powered by highly tuned racing engines. Speeds of up to 200 km/h are not unusual, over rough terrain.

(Model Specifications) ● Scale: 1/10 ● Overall length: 400mm ● Overall width: 230mm ● Overall height: 150mm ● Wheelbase: 251mm ● Tread: Front 172mm, rear 185mm ● Ground clearance: 16mm ● Weight ready to run: approx. 1480g ● Tire width/diameter: Front 21/73, rear 51/88mm ● Body: Polycarbonate ● Frame/chassis: ABS Resin ● Suspension: Front swing axle independent with coil damper, Rear, Rolling rigid rear axle with coil over oil filled dampers ● Sealed gearbox with competition differential ● Motor: RS540S (RS-540SD black motor optional) ● Gear ratio 1:8.2 ● Speed control: 3 step forward and reverse ● Power source: Tamiya 6V, 7.2V or 7.2V 1200mAh Ni-Cd battery required (not in kit) ● Radio control unit: 2 channel, 2 servo digital proportional required. (not in kit)



★Kit includes fuse for safety.

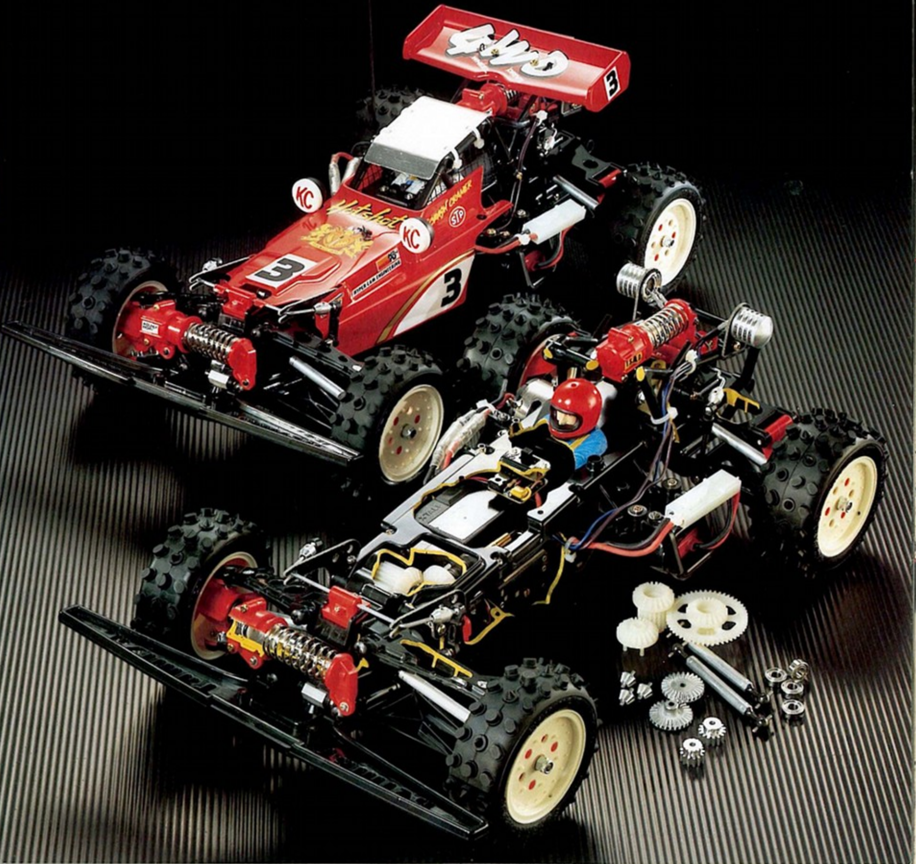
1/10th SCALE (5845) 6V·7.2V·7.2Vレーシング

The GRASSHOPPER

1
"CRASH" CRAMER
STP
1
1

1
"CRASH" CRAMER
STP

HOTSHOT 4WD (5847) 1/10 SCALE HIGH PERFORMANCE OFF ROAD BUGGY

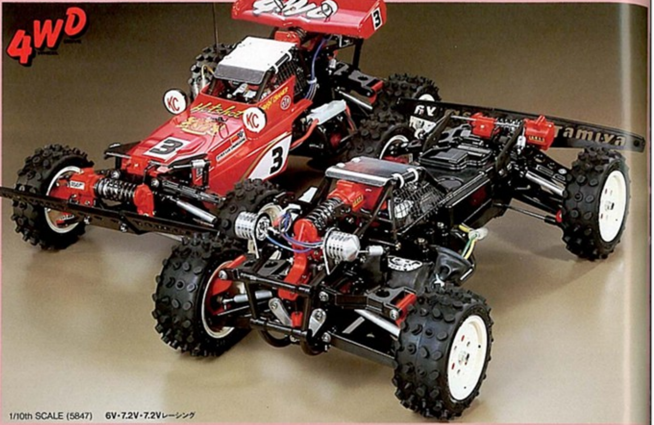


47 HOTSHOT 4WD

ホットショット4WD

The Hotshot is a full time 4 wheel drive vehicle, shaft driven with dual differentials, that uses no chains, belts or pullys. Ball thrust bearings keep the shafts properly positioned for maximum performance and maintenance at a minimum. Front and rear double wishbone suspension system that provides up to 40mm of wheel travel, giving almost unbelievable stability over the roughest of surfaces. The Hotshot is easier to control during cornering and straight running than the majority of two wheel drive buggy's on the market. Twin coil over oil filled dampers are 3 way adjustable for fine tuning to all road conditions. Body flex and sway are controlled by the steel stabilizers at front and rear. Low profile tires and light weight engineering plastics give this sophisticated 4WD an all up weight of only 1700 gms.

(Model Specifications) ● Scale: 1/10 ● Overall length: 390mm ● Overall width: 235mm ● Overall height: 153mm ● Wheelbase: 262mm ● Tread: Front and rear 194mm ● Minimum ground clearance: 15mm ● Weight fully equipped: approx. 1700g ● Tire width/diameter: Front 28/82mm, Rear 34/82mm ● Body: Polycarbonate ● Frame: Monocoque frame of ABS resin ● Suspension: Front and rear dobule wishbone ● Oil damper coil spring units are mounted both front and rear ● Motor: RS-540S (Black and Technipower Motors optional) ● Gear ratio: 1/8.7, 1/10.04 ● Power source: Tamiya Ni-Cd 7.2V or 7.2V racing pack (6V Ni-Cd battery available) ● Speed control: Forward 3 step and reverse 2 step ● Radio control unit 2 channel 2 servo digital proportional (not in kit)



1/10th SCALE (5847) 6V・7.2V・7.2Vレーシング

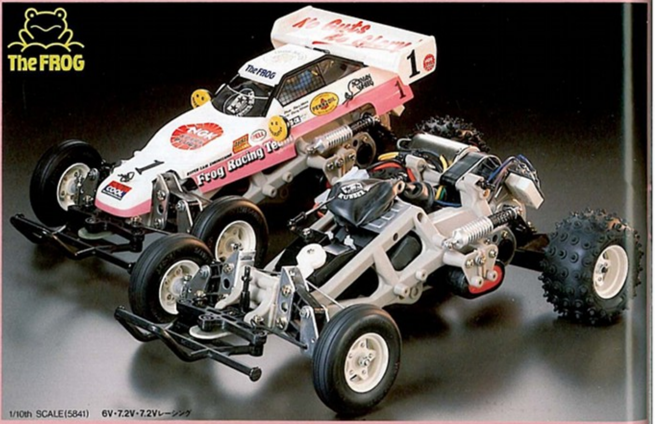
41 THE FROG

マイティ・フロッグ

A high performance off road competion car with the vast majority of quality tune up parts contained in the kit. The competition RS540S motor is included along with the adjustable oil filled competition shock absorbers. Frame is the race proven ABS resin space frame, both light in weight and extremely strong. Low center of gravity, high quality differential gearing and independent suspension make for safe and durable high speed running and cornering.

About real off road cars ● High performance racing buggys can be equated with the track type F1 racers. Highly tuned engines are mounted on lightweight slim frames of steel tubing riding upon 4 wheel independent suspensions with long movement shock absorbers. Smoothly traveling over rough terrain they are a sight to behold!

(Model Specifications) ● Scale: 1/10 ● Overall length: 400mm ● Overall width: 230mm ● Overall height: 150mm ● Wheelbase: 248mm ● Tread: Front 185mm, rear 187mm ● Minimum ground clearance: 30mm ● Weight fully equipped: about1.7kg ● Tire width/diameter: Front 21/73mm, rear 51/88mm ● Body: Polycarbonate ● Frame: ABS resin space frame ● Suspension: Front/double wishbone, rear/trailing arm with adjustable shock absorber ● Differential gear installed in sealed gear case ● Motor: Mabuchi RS-540S (540SD optional) ● Gear ratio: 1/6.7, 1/7.3, 1/8.5 ● Power source: Tamiya Ni-Cd 6V/7.2V standard battery or Ni-Cd racing pack ● Speed control: Forward/reverse 3 step ● 2 channel, 2 servo radio control required. (Batteries and radio unit not in kit.)

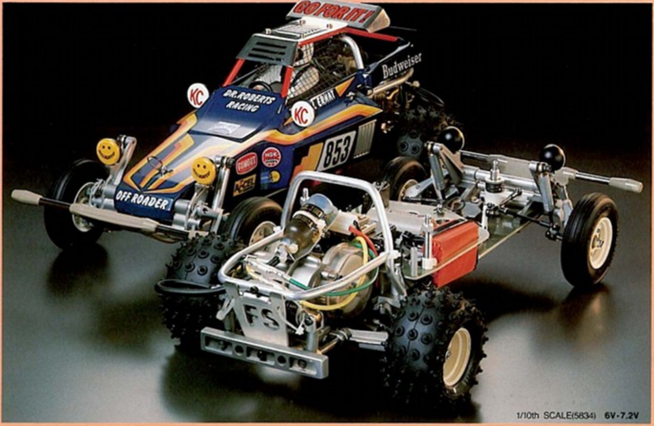


1/10th SCALE(5841) 6V・7.2V・7.2Vレーシング

34 SUPER CHAMP
ファイティング・バギー

This is a high performance off road buggy designed for the serious competitor. With a new rear suspension system that keeps the rear wheels on the ground for maximum control and acceleration. Spiked rear tires and straight tread front tires allow maximum maneuverability and traction on all surfaces. The 3 step racing speed controller has adjustable low and 2nd speeds as well as braking. The sealed aluminum gear box and hardened steel universal joints keep this vehicle running under continued hard use. Front suspension is the famous Tamiya oil damped shock system, and steering remains positive with the hardened ball joint assembly. For those who want to win in off-road competition, the Super Champ is the way to go.

(Model Specifications) ● Scale: 1/10 ● Overall length: 410mm ● Overall width: 218mm ● Overall height: 166mm ● Wheelbase: 250mm ● Tread: Front 170mm, Rear 180mm ● Minimum ground clearance: 35mm ● Weight fully equipped: 2.1kg ● Tire width/diameter: Front 19/74mm, Rear 51/88mm ● Body: High impact styrol ● Frame: 2mm thick FRP ● Suspension: Front/double trailing arm, Rear/F.P.D.S. (Free Floating, Progressive Damping Suspension) ● Oil damper installed in 4 wheels and with reservoir in rear wheels ● Motor: Mabuchi RS-540S ● Gear ratio: 1/6.5, 1/9.3 ● Power source: Tamiya Ni-Cd 7.2V battery, Tamiya Ni-Cd 6V battery available (not included) ● Speed control: Forward 3 step/reverse 1 step with braking circuit ● Radio control unit: 2 channel digital proportional (not included)

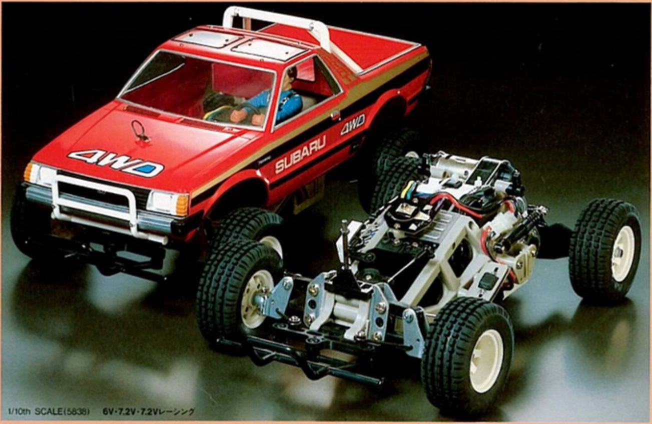


1/10th SCALE(5834) 6V·7.2V

38 SUBARU BRAT
スバル・ブラット

A high performance off road competition car makes this off roader stand out from the competition. At a very reasonable price, this is the ideal off road vehicle for the newcomer to the hobby. A dual purpose vehicle that is at home on a dirt track or asphalt circuit and has the options of extremely high performance with the addition of the optional RS-540S motor and other accessories. Body is patterned after the popular Subaru Brat and is injection molded for the precise detail demanded by the enthusiast.

(Model Specifications) ● Scale: 1/10 ● Overall length: 453mm ● Overall width: 228mm ● Overall height: 150mm ● Wheelbase: 248mm ● Tread: Front 197mm, rear 178mm ● Weight fully equipped: 1.9kg ● Body: High impact styrol ● Frame: ABS Resin space frame ● Sealed gear case ● Motor: Mabuchi RS380S (RS540 optional) ● Power source: Tamiya Ni-Cd racing pack or 6V/7.2V standard Ni-Cd ● Speed control: Forward/reverse 3 step ● 2 channel, 2 servo radio control required (Batteries and radio unit not in kit)

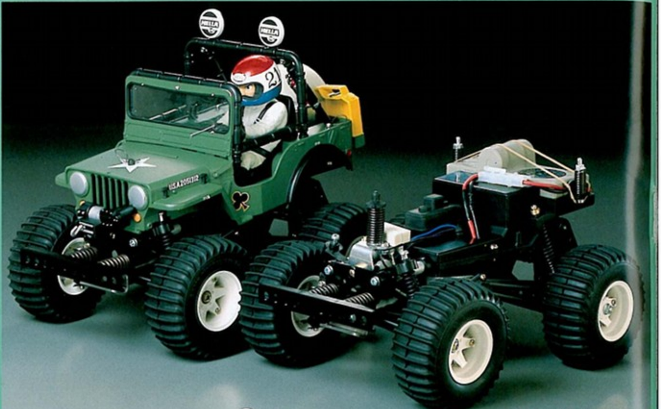


1/10th SCALE(5838) 6V·7.2V·7.2Vレーシング

35 WILD WILLY
ワイルド・ウイリス

A new concept in radio control off road enjoyment. A truely versatile stunt vehicle that makes spin turns, jump turns and wheelies with ease. Body styling is from the famous "Jeep", which is now utilized by auto sports fans for racing and hill climbing. High strength nylon, ABS resins and injected molded plastics are used in its construction for lasting durability. Precision ball bearings are employed in the system to ensure smooth running. A large differential gear and sealed mechanism box allows running in all types of weather. Large sand type tires and coil spring suspension dampen out all of the rough terrain surfaces. With a realistic driver figure of Wild Willy.

(Model Specifications) ● Scale: 1/10 ● Overall length: 343mm ● Overall width: 242mm ● Overall height: 268mm ● Wheelbase: 165mm ● Tread: Front 166mm, Rear 196mm ● Minimum ground clearance: 30mm (without differential gear case) ● Weight fully equipped: 2.6kg ● Tire width/diameter: Front/rear 46/103mm ● Body: High impact styrol ● Frame: ABS resin ● Suspension: Front swing axle, Rear trailing link ● Ball bearings utilized on front and rear axles ● With differential gear ● Sealed mechanism box ● Motor: Mabuchi RS-540S ● Gear ratio: 1/11 ● Tamiya Ni-Cd 7.2V battery: Tamiya Ni-Cd 6V battery available (not included) ● Speed control: Forward/reverse 3 step ● Radio control unit: 2 channel digital proportional (not included)



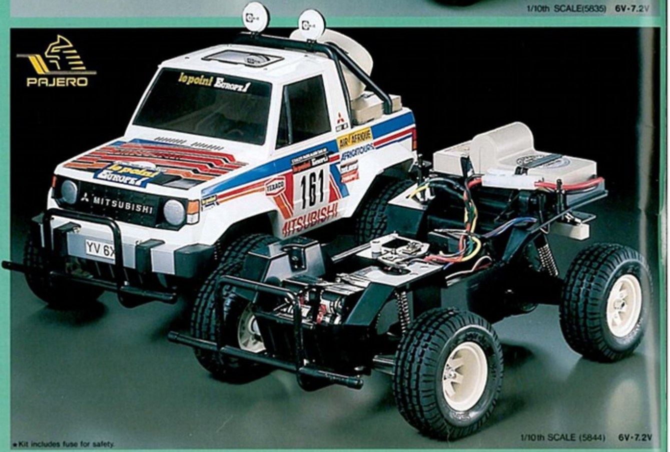
1/10th SCALE(5835) 6V・7.2V

44 MITSUBISHI PAJERO
三菱・パジェロ

The R/C Pajero is a dual action vehicle capable of exciting stunt action or high performance rally type competition. It is ruggedly constructed for long use and is easily convertible to either stunt or competition running by movement of the receiver battery. Front and rear suspension is damped by large coil springs and the sealed gear case includes a competition type differential. Detailed instructions makes this exciting vehicle easy to assemble and operate for the novice or expert.

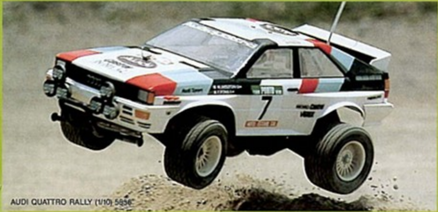
About the prototype ● The Pajero is a multi-purpose vehicle manufactured by the Mitsubishi Corporation of Japan. It is a four wheel drive automobile and was ideally suited for the Paris Dakar rally, considered the most grueling of all rally races. The Pajero won, in its class, victories in 1983 and 84 at this rally.

(Model Specifications) ● Scale: 1/10 ● Overall length: 300mm ● Overall width: 215mm ● Overall height: 200mm ● Wheelbase: 190mm ● Tread: Front 177mm, rear 180mm ● Minimum ground clearance: 15mm ● Weight fully equipped: about 1800g ● Tire width/diameter: Front, rear 35/82mm ● Body: High impact styrol resin ● Suspension: Front/swing axle independent, rear/rigid axle with coil springs ● Differential gear included in a sealed gear case ● Motor: Mabuchi RS-540S ● Gear ratio: 1/8.2 ● Speed control: 3 step speed controller ● Power source: Tamiya Ni-Cd 6V or 7.2V/1200mAh battery ● Radio control unit: 2 channel 2 servo digital proportional (not in kit)

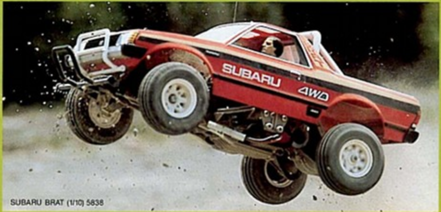


●Kit includes fuse for safety.

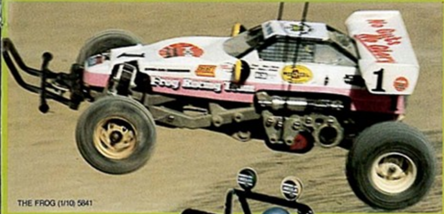
1/10th SCALE (5844) 6V・7.2V



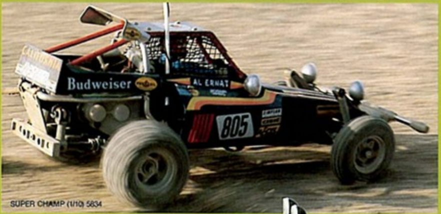
AUDI QUATTRO RALLY (1/10) 5836



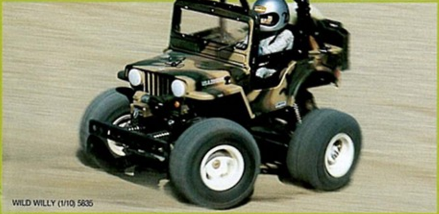
SUBARU BRAT (1/10) 5838



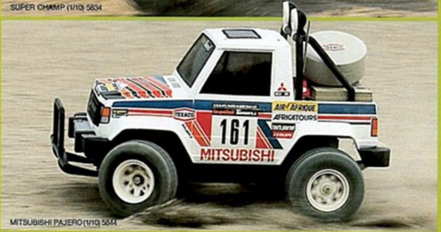
THE FROG (1/10) 5841



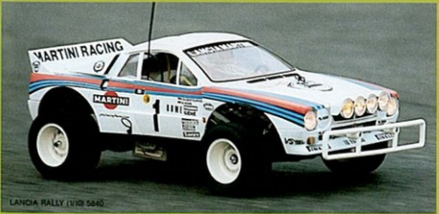
SUPER CHAMP (1/10) 5834



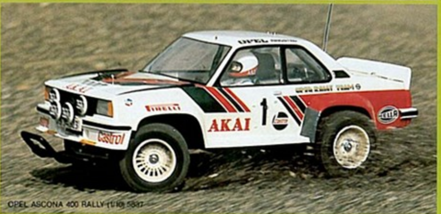
WILD WILLY (1/10) 5835



MITSUBISHI PAJERO (1/10) 5844



LANCIA RALLY (1/10) 5840



OPEL ASCONA 400 RALLY (1/10) 5837

48 TOYOTA 4×4 PICKUP BRUISER

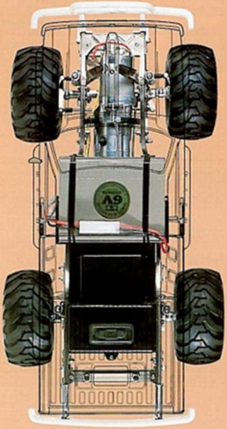
トヨタ・ハイラックス4WDハイリフト

This sophisticated R/C vehicle uses a three speed gearbox that is shifted via the transmitter for powerful four wheel drive in first gear, a two wheel drive at medium speed in 2nd gear and 2 wheel high speed running in 3rd gear. The gearbox comes factory assembled and the remaining components of the vehicle assemble much like the full sized Toyota. Huge tires and the powerful high torque RS-750SH motor provide spectacular performance for the good looking pick-up truck.

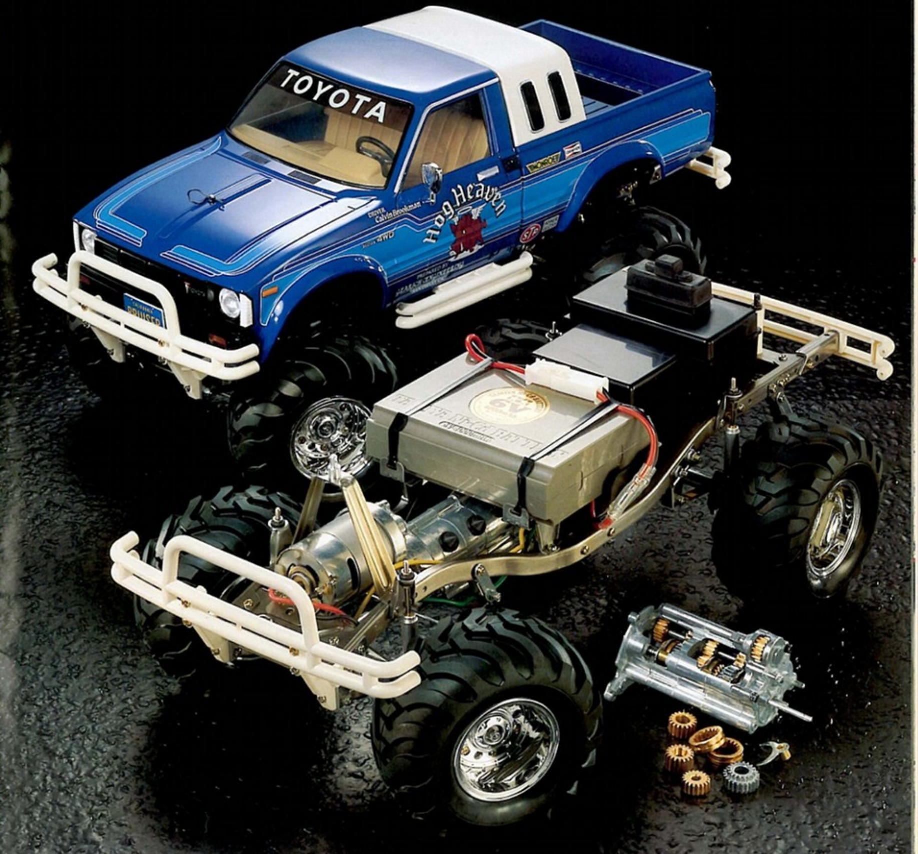
About the real vehicles ● 4 wheel drive pick-up trucks have been popular with the outdoor enthusiasts for years and many of these types of vehicles have been modified for racing and sporting events. One event called the "Mud Bog Race" is done in a muddy bog and is very exciting to watch.

(Model Specifications) ● Scale: 1/10 ● Overall length: 520mm ● Overall width: 278mm ● Tread: Front 200mm, rear 218mm ● Minimum ground clearance: 35mm ● Weight fully equipped: approx. 4.7kg (installation of Tamiya Ni-Cd 6V-4000mAh) ● Tire diameter/width: 125/60mm ● Body: High impact styrol ● Frame: Steel ladder frame ● Suspension: Rigid axle leaf spring with oil damper ● Sealed mechanism box and gear box ● Motor: RS-750SH ● 3 step gear change by operating R/C transmitter, 4 wheel drive in low speed ● Front wheels with free wheel hub ● 3 step speed controller ● Power source: Tamiya Ni-Cd 6V-4000mAh, 6V, 7.2V1200mAh or 7.2V Racing Pack ● Radio control unit: 4 channel and 3 servos radio control unit. (not included)

1/10th SCALE (5848) 6V-4000·6V·7.2V·7.2Vレーシング



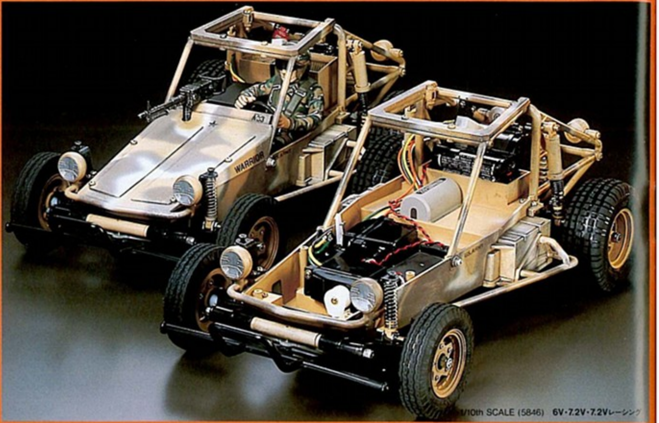
TOYOTA 4x4 PICKUP BRUISER (5848) 1/10th SCALE



46 FAST ATTACK VEHICLE
アタックバギー

Combine the versatility of an off road vehicle with a lightweight weapons system and you have a Military Fast Attack Vehicle that is now undergoing tests with the U.S. Army. The superb ability of the off road buggy's performance came to the attention of the military testing facilities and possible application for use in high speed reconnaissance and surprise attack roles. Armed with a heavy duty MG or TOW missile system, the FAV is awesome in performance and appearance.
Using a trailing arm suspension system at front and rear and a sealed gear box with heavy duty differential, the FAV has the running performance and stability of the full sized prototype.

(Model Specifications) ● Scale: 1/10 ● Overall length: 437mm ● Overall width: 220mm ● Overall height: 148mm ● Wheelbase: 255mm ● Tread: Front and rear 186mm ● Minimum ground clearance: 33mm ● Weight fully equipped: approx. 1760g ● Tire width/diameter: Front 19/74mm, Rear 35/83mm ● Frame: Bathtub type of ABS resin ● Suspension: Front and rear trailing arm indpendent ● Sealed gear box includes differential gear ● Motor: RS-540S motor ● Gear ratio: 1/7.54, 1/9.05 ● Speed control: Forward and reverse 3 steps ● Power source: Tamiya 6V, 7.2V or 7.2V racing pack Ni-Cd battery ● Radio control unit: 2 channel 2 servo digital proportional unit (not in kit)



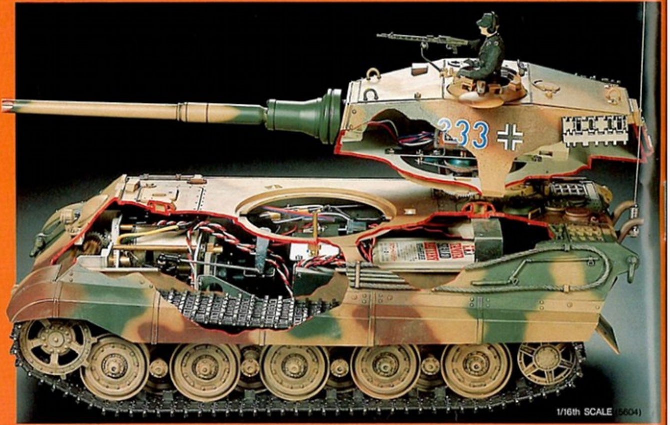
1/10th SCALE (5846) 6V·7.2V·7.2Vレーシング

PANZERKAMPFWAGEN VI. TIGER II (Sd.kfz182) AusfB
GERMAN HEAVY TANK TYPE VI
KING TIGER

4 GERMAN HEAVY TANK KING TIGER
ドイツ重戦車キングタイガー

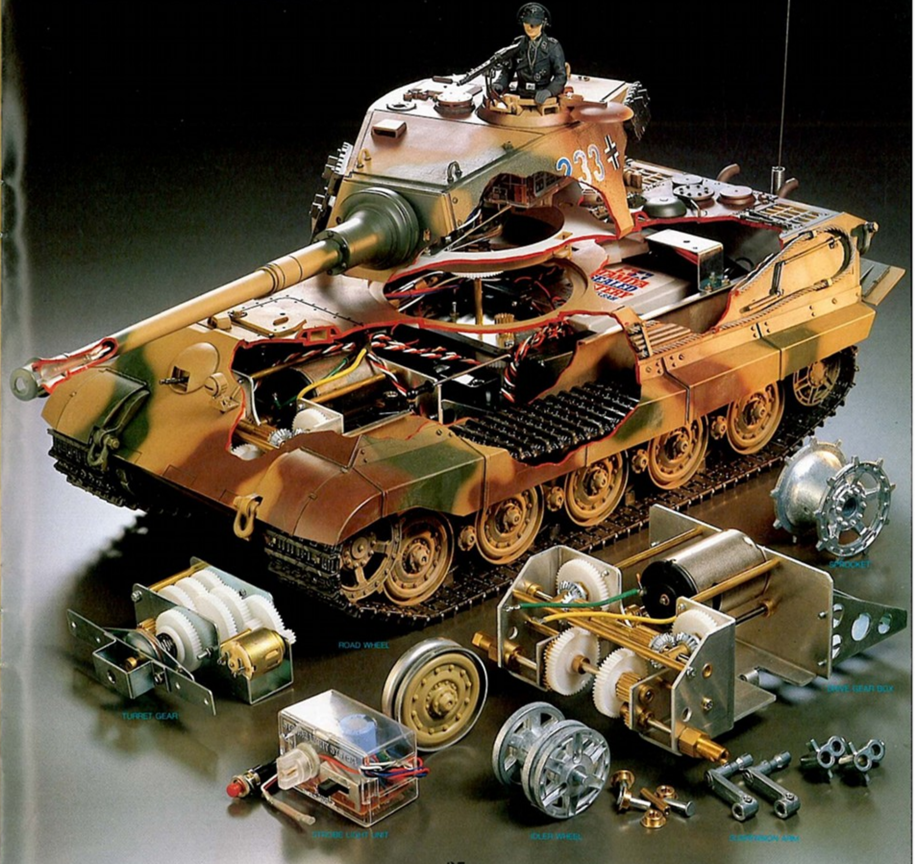
An exact 1/16 scale radio controlled model of the famous German King Tiger tank, said to have been the finest overall combat tank during world war 2. Model will accept up to four channels of radio control for turret rotation and gun flashing light. A minimum of two channels is required for operation. Individually linked with metal rods, the catapiller tracks are made from a new type of plastic for long life and ease of maintenance. Chassis and suspension system is of heavy duty aluminium and cast metal.
About the prototype ● Entering the front liens late in 1944, the German King Tiger tank was regarded as the most formidable battle tank to be introduced during the conflict. Mounting the well known 88mm, model 48 gun, plus two 7.62mm machine guns, and powered by a Maybach, water cooled, V12 engine, this tank had a top speed of 14-19km/h. A total of 487 King Tigers were produced during the war.

(Model specifications) ● Scale: 1/16 ● Overall length: 640mm ● Overall width: 236mm ● Overall height: 195mm ● Utilizes a heavy duty aluminium chassis with torsion bar suspension ● Requires a 2-4 channel radio and a Tamiya sealed or Ni-Cd battery for power ● Servo controlled 360 degree turret rotation and gun flashing ● Strobe unit contained in kit ● Factory assembled, twin clutch drive unit with heavy duty gears. (Battery and R/C unit are not included in kit)



1/16th SCALE (5604)

GERMAN HEAVY TANK KING TIGER 1/16th SCALE RADIO CONTROL

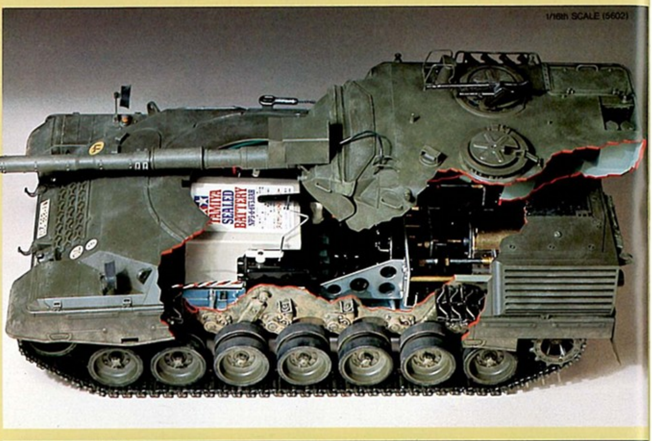


2 WEST GERMAN LEOPARD A4
西ドイツ・レオパルドA4戦車

This is a model of the West German latest tank. You will be satisfied with its excellent mobility on rough surfaces. It is a challenge to work on such exquisite mechanisms as the drive train with a dual clutch and independent suspension system with torsion plates. Also the precisely detailed scale model is very appealing when it is completed.

About the prototype ● The newest improved type of West German Leopard tank is the A4 which is one of the most formidable combat vehicles of the world. The spaced armour on the turret (double shells) gives it excellent defensive characteristics and the computerised firing control system linked with its main 105mm gun augments the offensive power of the tank.

(Model Specifications) ● Scale: 1/16 ● Overall length: 600mm ● Overall width: 216mm ● Overall height: 167mm ● Minimum ground clearance: 28mm ● Weight fully equipped: about 4kg ● Body: Styrol resin ● Frame: duralumin ● Motor power is transmitted through clutches. The tank can be made to run in either forward or reverse direction and simultaneously steer left or right ● Linked metal tracks ● All road wheels independent suspension systems with torsion plates and die cast suspension with stainless steel springs for prototypical operation ● Motor: Mabuchi RS-540 ● Gear ratio: 1/26.7 ● Power source: 6V 3.8A rechargeable storage battery ● Radio control system to be used: 2 channel proportional (not included) ● Tank can climb a 40 degree incline.



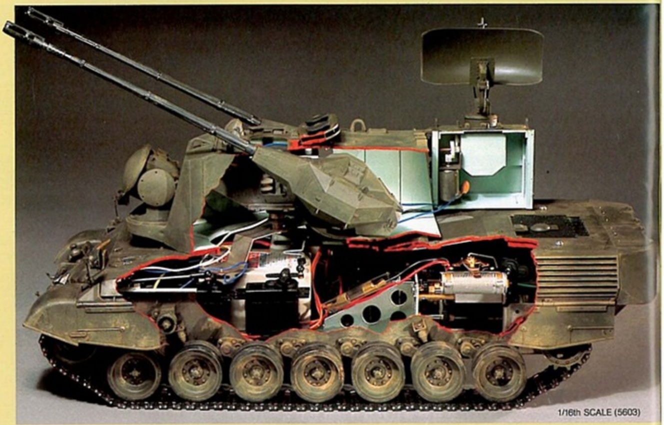
1/16th SCALE (5602)

3 WEST GERMAN GEPARD
西ドイツ・ゲパルト対空戦車

This is a radio controlled model which can be enjoyed not only because of its dynamic maneuverability, but also because of the many unique mechanics. The turret revolves 360°, the twin guns move up and down, and the radar at the rear revolves with the movement of the turret. The tank performs pivot turns and gradual turns through a drive unit utilizing a double clutch. All wheels have individual suspension with torsion plates making it like the prototype.

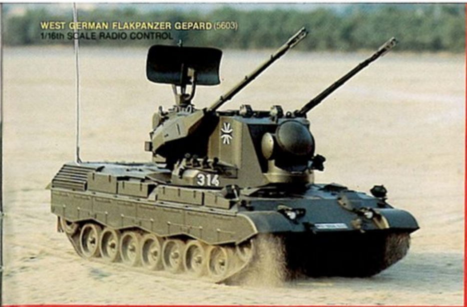
About the prototype ● The West German Gepard is the newest self propelled anti aircraft gun. It is basically the Leopard, a West German master piece tank, with the ordinary turret replaced by a larger turret with twin 35mm anti aircraft guns which are operated under a superb firing control system which is coupled with a computer and highly advance radars. It is capable of intercepting enemy airplanes flying at super sonic speed and at low altitudes.

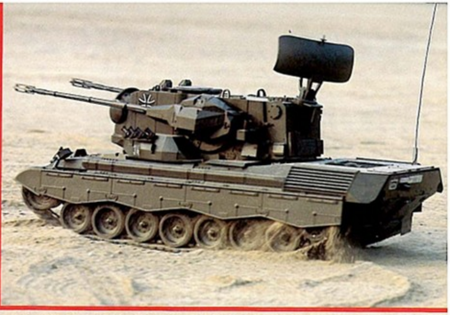
(Model Specifications) ● Scale: 1/16 ● Overall length: 495mm ● Overall width: 216mm ● Overall height: 256mm ● Minimum ground clearance: 28mm ● Weight fully equipped: about 5kg ● Body: Styrol resin ● Frame duralumin ● Drive unit system: Twin clutch mechanism, forward/reverse, pivot and gradual turning ● Turret revolution: 360°, guns movement: up and down, rear radar rotation ● Linked metal tracks ● Radio control system used: 2 channel proportional system is minimum requirement (not included)



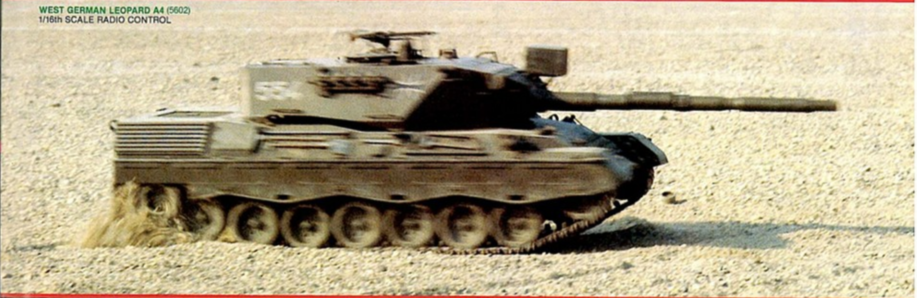
1/16th SCALE (5603)

WEST GERMAN FLAKPANZER GEPARD (5603)
1/16th SCALE RADIO CONTROL

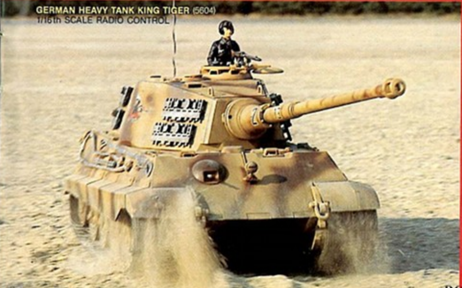


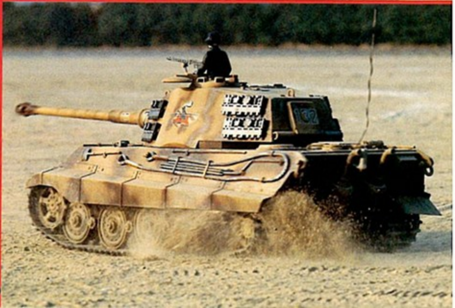


WEST GERMAN LEOPARD A4 (5602)
1/16th SCALE RADIO CONTROL

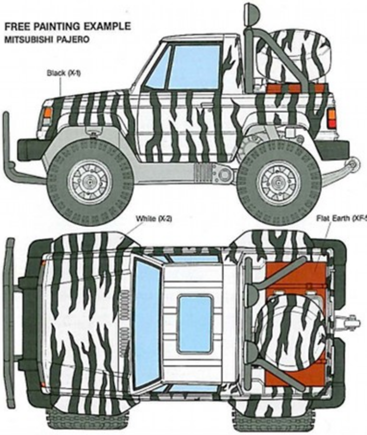


GERMAN HEAVY TANK KING TIGER (5604)
1/16th SCALE RADIO CONTROL

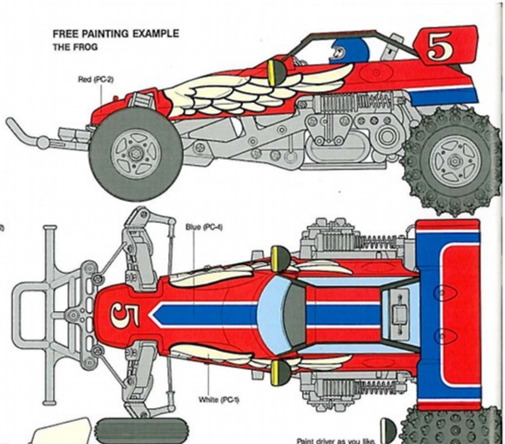




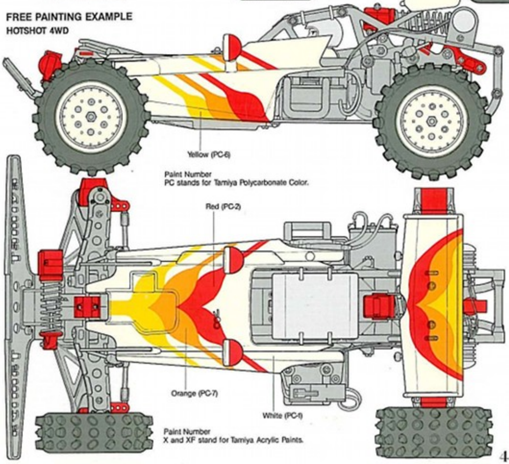
FREE PAINTING EXAMPLE
MITSUBISHI PAJERO



FREE PAINTING EXAMPLE
THE FROG



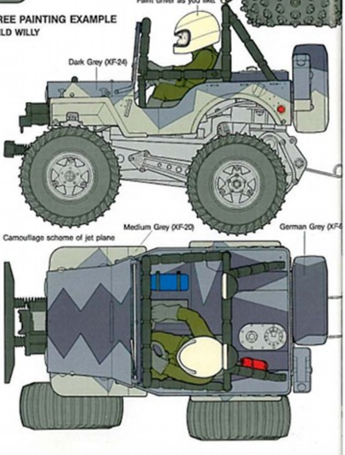
FREE PAINTING EXAMPLE
HOTSHOT 4WD



Paint Number
PC stands for Tamiya Polycarbonate Color.

Paint Number
X and XF stand for Tamiya Acrylic Paints.

FREE PAINTING EXAMPLE
WILD WILLY


Paint driver as you like.
Dark Grey (XF-24)
Camouflage scheme of jet plane
Medium Grey (XF-20)
German Grey (XF-

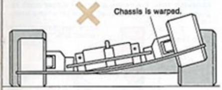
BUILDING A HIGH PERFORMANCE CAR

Even the same type of radio controlled electric car kit may produce much diversified performances and characteristics in accordance with a way it is assembled and adjusted; for example, some cars are easy to control and some are not so easy as others.

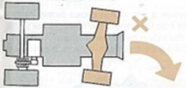
1. FUNDAMENTAL REQUIREMENT IS THAT THE CAR RUNS STRAIGHT

Even with a real automobile, moving in a straight line is the essential condition. A model should be so adjusted that it takes in a beeline for 5 meters or so without touching the steering wheel. A car which does not go straight cannot be controlled easily. Note the following points:

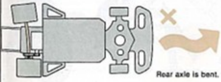
❶ A car with distorted chassis would not go straight; therefore correct the chassis so that the four wheels should touch the ground evenly. Particularly after collision, look into it carefully.



❷ If any wheel should not rotate smoothly, the car would turn in the direction of that wheel. Assemble a car with care so all wheels revolve evenly. This is related to car's running capability.

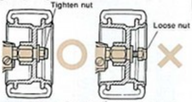


❸ If a front axle is not set parallel to the rear axle, the car will steer crooked.



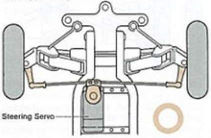
❹ With a bent rear axle the car will keep turning.

❺ When a wheel is not secured firmly with the nut, the car may be going in a zigzag way. Tighten the nut to keep the wheel in position in such a way that there is no play between the wheel and the axle, but still allows the wheel to turn smoothly.

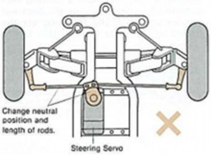


❻ The steering servo and servo horn should be arranged so that the front wheel will head forward right and the attitude of the servo horn is parallel to the front wheels (some cars requiring a right angle), when the steering servo (consequently the steering stick and trim lever) is in the neutral position. When this arrangement is not right, the car would not go straight or it will change its course unevenly to right and left. Being installed with a screw, servo horns can be readjusted by unscrewing.

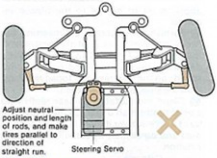
FROG (TOP VIEW)



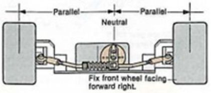
≪IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT≫

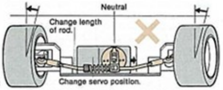


≪DOES NOT GO STRAIGHT≫

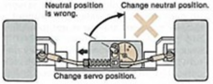

Adjust neutral position and length of rods, and make tires parallel to direction of straight run.
Steering Servo
×

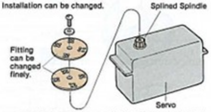
TORNADO RM MK.3 (FRONT VIEW)





≪IT GOES STRAIGHT BUT TURNS UNEVENLY RIGHT AND LEFT≫

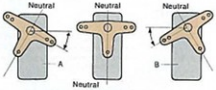




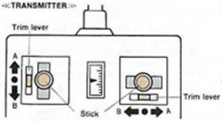
❼ Try to mount radio control units and batteries into a car, balancing the car evenly.

❽ Be careful that tires and steering linkage will not rub against the body. Lastly, have a test run to see if it advances in a beeline. If not, adjust it with the trim lever on the transmitter. With the trim lever, you can do the fine adjustment of servo movement, having the same effect of shifting servo position.

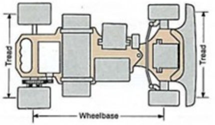
≪SERVO HORN MOVEMENT≫



≪TRANSMITTER≫



(HINT) A car with long wheel base in relation to tread has stability and tendency of going straight.

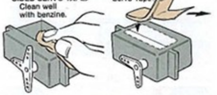


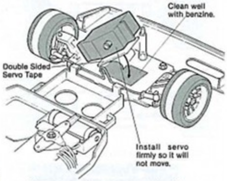
2. HOW YOUR CAR TAKES CORNERS

A car which goes straight is easy to control in principle. Such a car should have no peculiar action when taking corners. Cars with a peculiar way when turning can be corrected in the following ways.

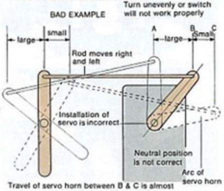
❶ The direction of front wheels are controlled by the movement of a servo. In case a servo is not secured in position firmly, the car tends to be unstable having a jittering or not responding to the control properly, or turning unevenly right and left. When dual-sided adhesive tape is used for mounting a servo, wipe the surface of the servo with cloth dampened with benzine or solvent carefully. (Lacquer thinner may dissolve servo cases.)

≪HOW TO APPLY DOUBLE SIDED SERVO TAPE≫





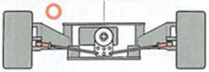
≪INSTALLATION OF SERVO HORN≫

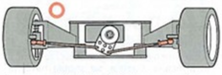

BAD EXAMPLE
Turn unevenly or switch will not work properly
large
small
A
large
B
Small
C
Rod moves right and left
Installation of servo is incorrect
Neutral position is not correct
Arc of servo horn

Travel of servo horn between B & C is almost vertical and shows less horizontal movement than from A to B.

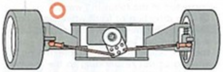
(Correct installation of servo horn)

Servo horn is in the correct neutral position.



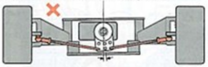


The steerage of the right and left tires corresponds to the arc of the servo horn.

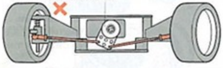


(When servo horn is installed incorrectly)

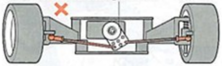
Servo horn is in the incorrect neutral position.



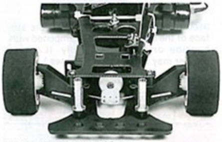
Tires move more to the right.



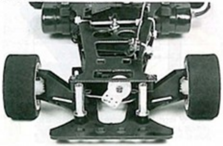
Tires move less when steering to the left.



Correct example <Installation of Servo>



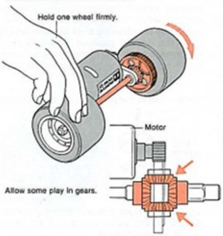
Bad example <Installation of Servo>



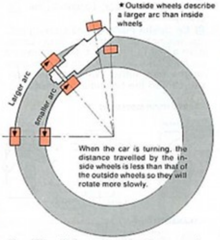
❷ In most cases where the car does not curve evenly, i.e. a small turn to the right and a bigger turn to the left under the same steering angle, it is caused by incorrect installation of a servo horn to the servo. In such a case, straighten the problem by taking the procedures as per stated in the previous chapter "Fundamental Requirement is That the Car Runs Straight".

❸ When a differential gear does not work properly (the same state as if without a differential gear), the car is apt to make a big turn or take corners awkwardly. Check it by holding one wheel firmly and turn the other wheel; smooth rotation indicates the differential gear is in good condition. When it does not, try to give some play in the gear meshing.

<CHECKING DIFFERENTIAL GEAR>



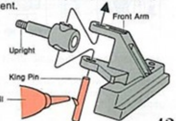
<WHY DIFFERENTIAL IS USED>



★Outside wheels describe a larger arc than inside wheels

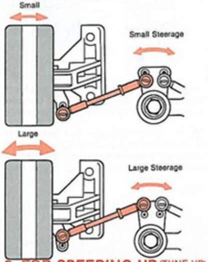
When the car is turning, the distance travelled by the inside wheels is less than that of the outside wheels so they will rotate more slowly.

❹ Check whether or not a servo rod, servo horn, or wheels are in contact with something like the car body and preventing right movement.



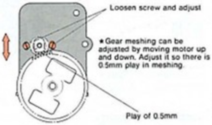
❺ Oil the king pin of the front wheels. Steering will then operate lightly.

(HINT) Steerage (degree of changing direction of front wheels) can be varied by shifting the connecting point of the servo rod. It is recommended for a beginner to select small steerage.



3. FOR SPEEDING UP (TUNE UP)

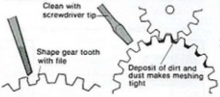
Most electric car kits are produced to come out with similar performance. In practice, however, the models assembled will show varied ability. The reason why some cars do not run faster than others are, in most cases, that they have additional friction around the rotating parts; in other words, they have a rotating section which, either partly or all, does not revolve smoothly. The following are the points to take care of, needless to say applying oil or grease to the places required.



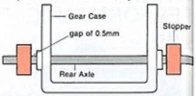
★Gear meshing can be adjusted by moving motor up and down. Adjust it so there is 0.5mm play in meshing.

❶ Furnish some play in the meshing between the pinion gear of the motor and the differential gear. Too tight meshing degrades the rotation and hampers the speed; on the contrary, too loose meshing would damage the gear teeth.

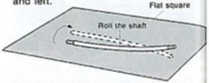
❷ Clean the surfaces of gear teeth with a used toothbrush or scrape them with the tip of a screwdriver if there is any deposit of dust and dirt which would kill the smooth rotation.


Clean with screwdriver tip
Shape gear tooth with file
Deposit of dirt and dust makes meshing tight

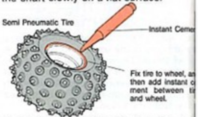
❸ A chipped or deformed gear tooth wi diminish the rotation. Particularly a bras gear is easily warped; in such a case, r shape it with a file carefully.



❹ The collar should not be located again the bearing too tightly. Secure them i such a way that there is some leeway s that the shaft would move slightly righ and left.



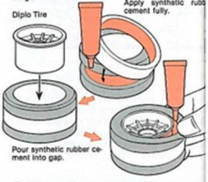
❺ A bend in the rear shaft will be a caus of unstableness of the car, especially whe running at high speed since it may mak the car slower compared to other cars. The bend can be found out easily by rollin the shaft slowly on a flat surface.



Fix tire to wheel, a then add instant c ment between ti and wheel.

Sponge tires should be glued firmly. In the case sandwich tires, the centre portion of rubber must glued carefully, otherwise it will come off when corne ing.

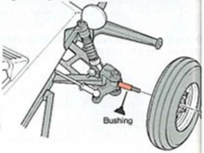
Apply synthetic rubb cement fully.



Pour synthetic rubber cement into gap.

❻ When a tire is not glued firmly or th wheel hub is warped, the effect is the sam as if the axle is bent; the car cannot go fast.

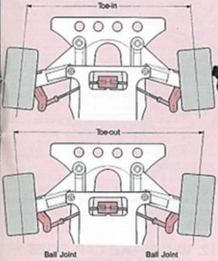
❼ Oiling of the front axle is often ove



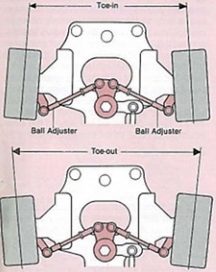
looked. Do it without fail. Poor rotation on the front wheels influences the car's speed more unfavorably than you may think.

⑧ Improper toe-in and toe-out adjustments are resistant to the car. The model car runs well without toe-in and toe-out or with a few degrees of either.

<PORSCHE 956 TOP VIEW>

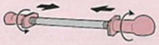


<GOLF, RENAULT 5 TOP VIEW>

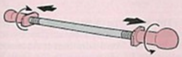


Alteration of toe-in and toe-out can be made by altering the ball adjusting joints. Adjust it as illustrated below. The 5068 Ball Adjusting Joint Set may be fitted on other model cars.

<<ADJUSTMENT OF THE LENGTH OF THE ROD>>



The length of the rod is shortened by turning clockwise.



The length is extended when turning anti-clockwise.

DAILY MAINTENANCE

Daily up-keep of your cars is important for maintaining performance. This will help you to find any possible defect. Without daily care the capabilities of acceleration and maximum speed of your models can deteriorate. Keep your cars in the best condition possible at all times.

1. CARE AFTER RUNNING

After running your model be sure to clean it and carry out any necessary repairs ready for the next time you wish to run the car.

ATTENDING TO CONTROL MECHANISMS

The radio control units and switches will be covered with dust after the model has been running. The contacts of the switches must be cleaned in order to avoid poor contact. Any component damaged or out of position must be replaced or repositioned. Dry cells may be in need of exchange. Also check the batteries of the radio control units. As a general guide, the receiver batteries are exhausted sooner than those of the transmitter. Inadequate batteries tend to be a cause of many breakdowns.

DIRTY COMPONENTS AROUND THE CHASSIS

After a day's activity, all parts and sections around the chassis will be in a dirty condition. Look particularly at the moving parts; any foreign objects in the bearings influence the rotation of the wheels. For inaccessible places use Tamiya Oil Spray, which has a detergent effect and is very useful for cleaning. Check if any nut or bolt is loose and oil all journal sections. See if the rear axle is bent; replace if necessary.

DAMAGE TO BODY

Radio controlled racing cars are not only for running, but are also fine scale models. It is certainly not recommended to run the cars without a windscreen, with a door broken, or with a big hole on the body or any similar damage. Always keep your model in the best condition possible. Items you will probably need for repairing are plastic sheet and different kinds of glue. Synthetic rubber cement and instant glue are useful, as well as plastic glue.

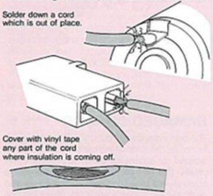
2. TO KEEP YOUR CAR AT PEAK PERFORMANCE

Parts will wear out or become broken after periods of high speed running and use. Replace any damaged parts and keep your model constantly rejuvenated.

MAINTENANCE OF ELECTRIC SYSTEMS

★REPAIRING ELECTRIC WIRE

The electric wire is able to withstand to some degree moisture and stretching. Accidental contact of exposed wires will result in a short-circuit, which may damage the battery, motor or switch; sometimes causing components to burn up. A wire out of place may jam into a shaft of the car. When the wiring of radio control units or antenna becomes short-circuited, or when the wiring of a car rubs against a gearcase or other parts which results in a noise being emitted, the radio control unit will be disturbed and will not operate correctly. If the insulation should come off any part of the exposed electric cord, it must be mended immediately and thoroughly. Any joins in the wiring about to break should be rejoined firmly, preferably by soldering. If a radio control unit or antenna should fail to work correctly, it must be repaired by a competent radio repairer.



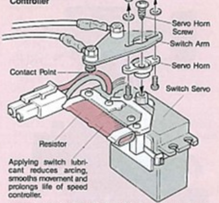
Solder down a cord which is out of place.

Cover with vinyl tape any part of the cord where insulation is coming off.

★POOR CONTACT OF WIRING

Since it draws a lot of current, the speed control switch when it sparks will scorch its contact points. This scorching will, after a while, cause poor contact. The points of the connectors and switches must be polished once in a while to allow electricity to flow with less resistance. Most poor contacts in the connectors may be repaired by a screw driver; refer to the chapter headed "Trouble Shooting." Scorched contacts of a switch should be carefully polished with very fine sandpaper. Metal contact surfaces wear away after repeated use, particularly ones in a speed control switch which are used excessively, and should be replaced after some period of operation.

Exploded View of 956 Speed Controller

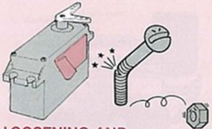


Applying switch lubricant reduces arcing, smooths movement and prolongs life of speed controller.

MAINTENANCE OF MECHANISM AND CHASSIS

★LOOSENED INSTALLATION OF RADIO CONTROLLED UNITS

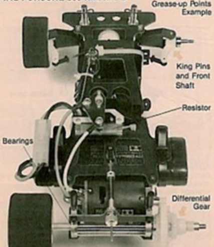
The adhesive power of double-sided tape is much reduced after one application. If the tape is reused to install servos or receivers, the units will be moved out of position due to accidents or vibrations. Loose bolts and nuts fixing the servo bands and servo trays may result in inaccurate control of the car. For installing steering servo and speed control servo firmly, renew the tape and tighten loosened bolts and nuts. Keep the double-sided adhesive tape in a cool and dry place, otherwise its adhesive properties may deteriorate. On the other hand, if the tape applied will not come off easily, wipe with a cloth dampened with benzine or water. The same cloth moistened with benzine assures strong adhesion if used to clean the surfaces of objects, i.e. servos and servo mounts, before applying the new tape.



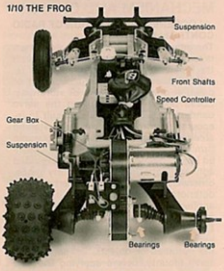
LOOSENING AND DETERIORATION OF BOLTS AND NUTS

Nuts and bolts are indispensable assembly parts and can become damaged during the running of the car or by misuse. Screws tightened excessively may twist off, or the thread may become worn. Bolts can be bent during collision and if not replaced could snap off during racing with disastrous results. Therefore, it is sensible to always change any bolts and screws that are bent, cracked or damaged in any way, before the next race.

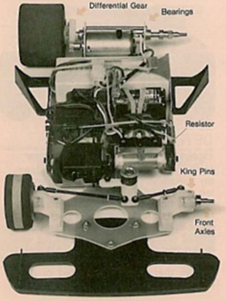
1/12 PORSCHE 956 RM. Mk. 5



1/10 THE FROG



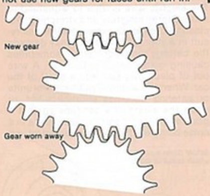
1/10 BRABHAM BT-50 BMW TURBO (CS)



Check that all nuts and bolts, including lock nuts for fixing the shafts and all other small screws, have not slackened. Retighten if necessary.

MESHING OF GEARS

The gears play a vital role in transmitting the motor power and they are subject to wear. Any dirt and dust between the gear teeth will act as a file and abrase the surfaces and any such deposit should be removed carefully. Occasionally, gears may be broken by small pebbles and these must be replaced. Your car will run much better if regular attention is given to the careful cleaning etc. of the gears. Check that the gears have not worn away so that they have to much play and cannot be adjusted. New gears require running in. If possible, do not use new gears for races until run in.



DAMAGED CHASSIS

The performance of your car will be greatly affected by the state of the car's chassis. A bent, warped, or otherwise deformed chassis will cause the car to have different cornering characteristics. A damaged front chassis and gearcase will similarly adversely effect the performance of the car. Check for any twist or bend of the chassis by placing it on a flat surface. Some twisted chassis may be reformed. A crooked chassis may possibly be repaired by pounding with a plastic hammer. However, this may weaken the structure and make it impossible to fit perfectly.

GREASE-UP POINTS

It is necessary to grease around the front and rear axles where parts rub against each other to reduce friction and abrasion. After races, besides checking of structural or mechanical parts, it is important, especially after races in the rain or through puddles, to look for signs of rust on metal parts and to check if rotating parts require oil or grease. Correct lubrication gives not only smooth rotation of wheels, but also allows poper adjustment to the steering and gives smooth operation. Lubricate the meshing of the gear teeth, suspension systems and around the rear axles which are influential in giving effective power transmission. The Tamiya Oil Spray is very useful for taking care of these sections.

TROUBLE SHOOTING

1. WHEN THE CAR FALLS TO MOVE

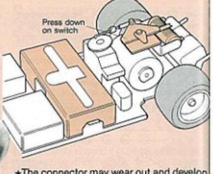
❶ See if the switching servo operates properly. If not, you may have neglected to switch on either or both your transmitter and receiver, or your batteries are dead. You may have even failed to install batteries. Also, the wiring between the receiver switch and the receiver or between the receiver and the servo may be disconnected. Inoperative radio control units can be detected by replacing them with another unit.

❷ Remove the pushrod between the speed control switch and the switching servo. If the servo operates correctly, then the method of installing the rod, or the position of the servo may be wrong and excessive resistance may hinder the movement of the servo. Something may also be in the way of the movement of the speed control switch. Please also refer to (2-❶) in "When the Car Does Not Gain Speed" for methods of mounting a servo correctly.

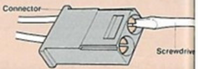
❸ When the switching servo and the speed control switch are operative and the motor does not rotate, see if the batteries are fresh or charged, and the fuse is in good condition. If the fuse is blown, repair the short circuited portion, referring to "Causes of Blown Fuse" before replacing the fuse.

❹ Remove the motor from the gearbox and see if it will run. If it does, the meshing of the gears may be too tight, or the rear axle or the drive shaft may be seized. Remove the axle or shaft and carefully polish the seized part with sandpaper and lubricate it. Determine if the axle or shaft will revolve smoothly in the bearings. "For Speeding Up" in "Building Up a Car of High Running Capability" is good reference material for this.

❺ When the motor is removed from the gearbox and does not run, incorrect wiring, or poor contacts in the battery box, switch, or in the connectors are possible. Check the wiring first. If nothing is wrong with it, press down on the battery box, switch and connectors. If the motor starts to run, it indicates that the component pressed on may have a poor contact or connection.



★The connector may wear out and develop bad contact after repeated use. Crimp th tubular contact point using the tip of screwdriver to make the contacts slip in firm

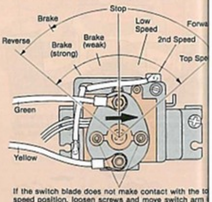


❻ Since the motor is precision made, it ca become damaged when dropped, dipped i to water, short circuited, or connected to to many batteries.

2. WHEN THE CAR DOES NOT GAIN SPEED

❶ Make sure the speed control switc operates properly. If the switch goes into hig speed only in the reverse position, or whe manipulated by hand with the servo rod di connected, the neutral position of the serv may be out of adjustment. Adjust it with th trim lever of the transmitter. After that adjus ment, if it does not shift into the reverse spee but it works correctly in the forward settin see if the servo and the servo rod are instal ed correctly as illustrated below so that th switch blade can go all the way to the ma imum speed end. When the adjustment is i

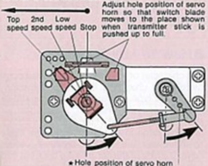
◀RACING SPEED CONTROLLER▶



If the switch blade does not make contact with the to speed position, loosen screws and move switch arm direction of arrow. Operation angle of the servo ho must be at least 37 degrees. If less, you may not put ve cle into reverse speed if you have adjusted the blade f contact with the top speed position.

★This new type of speed controller has th switching plate connected directly to th servo horn. Make sure that the connectio wires are free to move with the servo hor and not obstructed in any way.

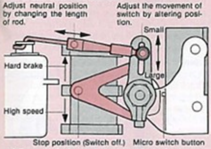
◁3 STEP SPEED CONTROLLER▷


Top speed
2nd speed
Low speed
Stop
Adjust hole position of servo horn so that switch blade moves to the place shown when transmitter stick is pushed up to full.

★Hole position of servo horn decides switch stroke.

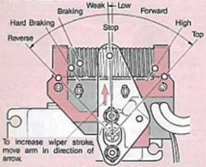
★Adjust the height of servo horn and switch plate as even as possible. Bad contact happens in top speed position, if the difference between the two is large.

◁RM SPEED CONTROL SWITCH▷


Adjust neutral position by changing the length of rod.
Adjust the movement of switch by altering position.
Small
Large
Hard brake
High speed
Stop position (Switch off.)
Micro switch button

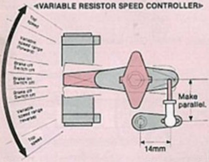
★Micro switch works when the wiper arm rests on the top speed position.

◁956 SPEED CONTROLLER▷



★Wires move with switch plate and are required full length. If they are restricted by the battery, contact can be bad and control difficult.

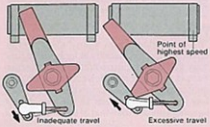
◁VARIABLE RESISTOR SPEED CONTROLLER▷


Top speed
Variable speed range (Forward)
Variable speed range (Reverse)
Make parallel.
14mm

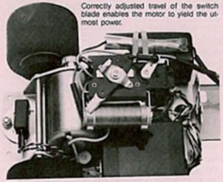
★When you use a variable resistor speed controller, attach servo so that switch plate moves to top speed position. If the switch plate doesn't move correctly, troubles can occur.

* correct and the switch blade does not move all the way to the end or goes over it, problems may arise.

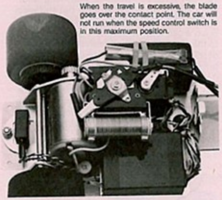
❷See if something is in the way of the servo horn or the speed control switch which can block their proper movement.



◁ADJUSTMENT OF SWITCH▷

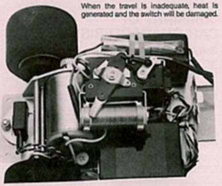


Correctly adjusted travel of the switch blade enables the motor to yield the utmost power.

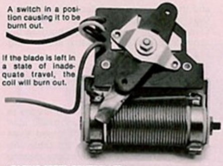


When the travel is excessive, the blade goes over the contact point. The car will not run when the speed control switch is in this maximum position.

★The adjustment of the blade should be made referring to the assembly instruction sketch of the kit.



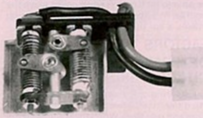
When the travel is inadequate, heat is generated and the switch will be damaged.



A switch in a position causing it to be burnt out.

If the blade is left in a state of inadequate travel, the coil will burn out.

◁RACING SPEED CONTROLLER▷



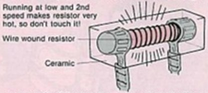
★Coils of Racing Speed Controllers get burnt and its color will change, but this is not a problem.
With inadequate travel of the switch blade, the coil produces heat and the color of the lever or bakelite plate will change, sometimes causing the coil to burn out.

❸ If the motor does not run at the maximum speed when the speed control switch is in its maximum position, poor contact of batteries or of the switch terminals can be suspected. The poor contact can be found by pressing the switch as it is moved into the high speed position.

❹ Check to see if the gear meshing or the shaft are too tight. Make sure the wheels rotate smoothly. Be sure to lubricate shaft and gearbox.

3. ABOUT VOLTAGE DROPPING RESISTORS IN R/C CARS

Resistors are utilized in all speed controllers to vary the amount of voltage passing to the motor so that different speeds can be obtained. Resistors impede the flow of current from the battery to the motor and the excess current is bled off in the form of heat. At full speed, the resistor is not impeding any current flow, so there is no heat to dissipate. When "Throttling" back, to slow down, or run at a lower speed, the fixed resistors will get very hot in the step type speed controllers. The variable control speed resistor (Wire wound) that use a sliding blade, are electrically altering the length of the resistor wire, so this type of speed control does not heat up like the others. When driving in the low or 2nd speed the ceramic resistors will get very hot, so do not touch them.



Running at low and 2nd speed makes resistor very hot, so don't touch it!

4. WHEN THE CAR DOES NOT TURN

❶ Does the steering servo operate properly? If not, the wiring from the receiver to the steering servo may be disconnected.
❷Remove the steering servo. If it operates normally, the servo horn or the servo rod may be rubbing against something. Also, it is possible that the king pins of the front wheels do not move smoothly.
❸ When the car does not take corners well, refer to 1 and 2 on the page of "Building a High Performance Car."

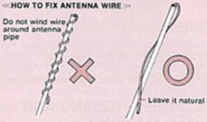
5. WHEN A CAR DOES NOT STOP

❶Do the speed control switch and the switching servo stop at the neutral position?. If not, adjust it with the trim lever on the transmitter. After the adjustment, if the car runs at high speed even though the switch is in the stop position, the switching servo or the servo rod may be mounted improperly. Correct them referring to ❶ in "When the Car Does Not Gain Speed".
❷ Excessive play in the connection between the switching servo and the speed control switch may cause the switch to fail to return to the stop position even when the servo is at the neutral position.

6. IF THE RADIO CONTROL DOES NOT OPERATE

❶If the batteries of the transmitter or receiver are low, the radio control will not operate. Replace with new batteries.
❷ Are the antennas of the transmitter and receiver OK? The following actions make the reception of radio signals poor: shortening the receiver antenna wire, winding the wire around the antenna tube, leaving the wire inside the model car, or removing the insulation of the wire.

◁HOW TO FIX ANTENNA WIRE▷



❸ Make sure that metal parts of the car do not rub together under vibration. Rubbing between metal parts will sometimes generate radio noise which disturbs radio control.
❹ Hold the transmitter away from the car with the control stick in the neutral position. If the servos are glitching, it is most likely caused by radio interference.

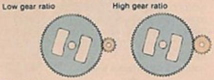
CHARACTERIZING A CAR

There are a variety of car characters: fast cars, cars with excellent acceleration, cars with good cornering capability, and so forth. Cars assembled from kits come out diversified in quality because they are built up through the assembler's own techniques. Build your car in your own way. The most apparent characterizations are formed in the gear ratio and the steering characteristics.

1. MAXIMUM SPEED AND ACCELERATION CAPABILITIES (GEAR RATIO AND SPEED)

At a given output power of the motor, the maximum speed and acceleration capabilities are determined by the gear ratio. With electric cars, the relation of the pinion gear on the motor shaft to the gear of the rear axle is important. You will have a higher gear ratio with a smaller pinion gear (smaller number of teeth) and a larger gear on the rear axle. The opposite makes a low gear ratio. With a high gear ratio, the car has a better acceleration capability, but a limited maximum speed. A car with a low gear ratio has poor acceleration but a high maximum speed.

A car with high gear ratio is suitable for a technical course which is built with hair pin curves demanding low speed driving, while a car with a low gear ratio is for a speed course consisting of longer straightaways and curves of longer radii.

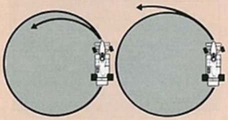


TIRES

The diameter of the drive tires is also related to the speed and acceleration characteristics. The larger the diameter of the drive tires is, the higher the speed of the car will develop within certain limitations.

2. UNDER STEERING AND OVER STEERING (STEERING TENDENCY)

When the steering wheel is turned, the car will also turn in the same direction. However, most cars have the tendency to turn excessively or inadequately. These characteristics are called steering traits. Cars that turn excessively have over steering traits and the others have under steering traits. Cars that turn in close proportion to the control have neutral steering. This is hardly achieved except with cars that are running at a low speed.



STEERING WHICH IS EASY TO CONTROL

A car with slight under steering is easy to drive. A car with over steering will spin when taking corners at a high speed. Even on a straight course, it is unstable. An under steering car has difficulty making sharp turns, and at a high speed it may not be able to take corners and could leave the course. In either case, excessive steering makes a car difficult to control.

FACTORS TO DETERMINE STEERING CHARACTERISTICS

The steering characteristics are affected by the difference between the traction of the front and rear tires. When the traction of the front tires is greater than that of the rear tires, the result is over steering. The opposite condition causes under steering. Therefore, adjust the traction of the rear tires so that it is a little greater. You will then attain a slight degree of under steering.

The traction of a tire is determined by the weight it carries, by the area of contact of the tires on the road surface, and by the softness of the tire surface. The heavier the weight a tire carries, the larger the contact area becomes, and the softer a tire is, the greater the traction becomes with certain limitations.

ADJUSTMENT OF STEERING CHARACTERISTICS

★DECREASING OVER STEERING

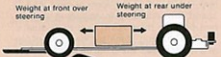
(1) Place a heavy load, such as batteries, at rear portion of the car.

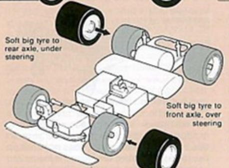
(2) Replace the rear tires with larger ones or replace the front tires with smaller ones.

(3) Replace only the rear tires with sponge tires.

★DECREASING UNDER STEERING

(1) Place a heavy load at the front of the car.




Soft big tyre to rear axle, under steering
Soft big tyre to front axle, over steering

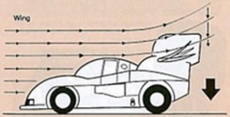
(2) Install front tires that are larger.

(3) Replace only the front tires with sponge tires.

These three remedies are the basic ways to change steering characteristics. The traction of cars with suspension systems can be increased by decreasing suspension spring tension. 30% -40% of the car's full weight should be on the front wheels and 70% -60% on the rear wheels.

WING

The wing attached on many racing cars is employed to gain stability at high speed running. With your radio controlled cars, the rear wing is used to press down the rear wheels for improving the traction on the road. In this way, the gripping power of the rear wheel becomes greater than that of the front wheels and the steering trait changes toward understeering. The faster the car goes, the more effective the wing becomes, that is, the greater the down thrust on the rear wheels. Depending upon the way you adjust the wing, the car can have an excellent cornering characteristic on a low speed curve, but still keep superb stability on the high speed straights. Such a car, also, will show a good adhesion to the road at high speed running. The effect of the wing is lessened when the wing is flattened. The more it is lifted, the greater the down-force. However, it increases the air drag, too, and the velocity of the car slowed. Therefore, the adjustment of the wing must be made carefully, and with the proper adjustment an ideal maneuverability will be attained.



Downward force on the aerofoil forces the rear tires to grip better.

SUMMARY OF CAR CHARACTERISTICS

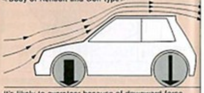
Before you become familiar with controlling techniques, it is recommended to keep the car under steering. (Refer to "How your car takes corners" on page 41.) Adjustment of toe-in and toe-out, tread and wheelbase all have some connections with steering characteristics. These adjustments interact closely. Test your car in various ways and find out the most proper steering characteristic for good control.

REPLACEMENT OF BODY

●How to attach body

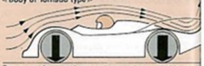
The character of a model can be altered com pletely by changing its body. Generall passenger type cars such as the Renault Golf will tend to oversteer, due to the a pressure on the front of the body while runn ing. The Tornado and Porsche 956 are likel to understeer due to the air pressure forcin down the rear of the car, making the front en lighter. There is no way that anyone ca recommend a particular type of body for you use, as driving techniques and road surfac conditions vary so much; however, if you ex periment a little you can find the best sty ing for your driving. Another advantage to ha ing more than one body, is that you can ente into different classes of racing, using th same basic chassis, but with a different bod Practice with different bodies to see whic is best for your driving techniques.

≪Body of Renault and Golf type≫



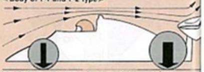
It's likely to oversteer because of downward force at front end.

≪Body of Tornado type≫



Downward force at front and rear balance, and is neut

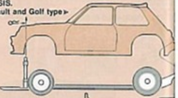
≪Body of F-1 and F-2 type≫



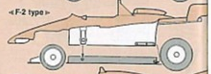
It's likely to understeer because downward force at rear is larger.

Be sure your choice of spare body will fit th chassis. Some bodies will require modificatio and others cannot be made to fit som chassis.

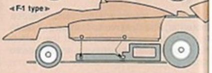
≪Renault and Golf type≫



≪F-2 type≫



≪F-1 type≫



ENJOYMENT OF IMPROVING PERFORMANCE

As you attain proficiency in controlling cars, you will be tempted to improve your car. This chapter will introduce handy ways of increasing performance. The most important matter you have to keep in mind when you modify your car is to keep everything in balance. By putting a big motor on your car, you can make it run faster. Still it cannot be an improvement of performance if it has lost stability. Most kits on the market are produced by the manufacturer with all factors considered such as speed, maneuverability and durability. So try to enhance the collective performance of your car.

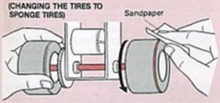
1. UTILIZING AVAILABLE PARTS FOR IMPROVEMENT

Some car kits have optional tune up parts available on the market, such as more powerful motors, differentials and ball bearings. As an example, changing the RS380 motor for the more powerful RS540 will greatly increase the speed of your model. Ball bearings are very effective in reducing the rotating friction of wheels and axles, allowing more motor power to the driving wheels. On racing cars it is good practice to replace the rubber like semi-pneumatic tires to sponge tires for better traction. Different sponge tires are available for your racing needs. For the front wheels, special diplo tires are available, which will improve both the straight running ability and cornering simultaneously.

2. ADOPTING PARTS MADE FOR OTHER KITS

You can also adapt repair and tune up parts for other vehicles to your own vehicle. For example, the Tamiya Ford C100 Racing Master Mk. 4 kit (5833) includes the RS-540 motor, but a replacement to the more powerful RS540SD Black Motor can be made without any modifications at all. A speed controller without a diode in the circuit doesn't allow the use of the motor battery as a receiver battery also, thereby lightening overall weight. If you replace the speed controller to one with a diode, you can then use the 7.2V battery for both purposes safely. By adding the Tornado Racing Master Mk. 3 (5832) mechanism deck and differential unit to the Ford C100, it will have similar performance to the Tornado. Select tires according to the road surface, and tune up your vehicle with the many parts available. You will be amazed as how much of an increase in performance you can obtain with very little effort and expenditure of funds.

(CHANGING THE TIRES TO SPONGE TIRES)



3. UTILIZATION OF PARTS OF OTHER KINDS OF MODELS AND EVERYDAY LIFE COMPONENTS

Many sorts of parts are available on the market, other than radio controlled electric car parts. For instance, a type of push rod connecting servo horns and control units in a model are sold which have threaded ends and easy to adjust length. Also, a velcro pad with one-sided adhesive may be used for binding the wiring and installing car bodies, etc. So these items of other crafts besides model building and components of daily necessities can be of good use for your radio controlled electric model cars.

4. LIGHTENING WEIGHT

Lightening the weight of a model car is another effective way to enhance the performance. Cutting off part of chassis and gearbox case is often done. Also, the window shield is made of thin 0.2 mm transparent plastic plate or only 1 battery unit supplies energy to both the radio control receiver and the driver motor is employed. But radio controlled cars are subject to shocks from road surfaces while running, and to the impact of collisions. So the car must be very sturdily built.

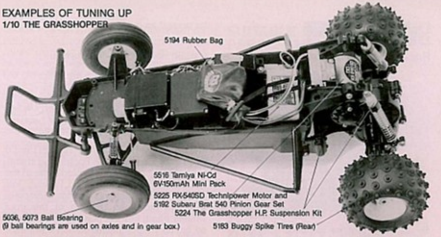
5. SUPPLEMENTARY OF BATTERY POWER AND REMODELLING MOTOR

By increasing the number of batteries, improvement of performance can be certainly achieved. However, this must be done very carefully because the motor and the switch may be overstrained. Rewinding a motor armature with thicker wire makes a motor rotate faster, but it will draw much more current. Also, filling up the gap between the armature and the magnets amplifies the torque; this can be done by inserting 2 or 3 sheets of cellophane in the place. Nevertheless, the motor is such a precision made item that these renovations may decrease performances or deteriorate the durability of the motor. And chances are in many official racing events that the maximum voltage is placed under restriction; sometimes reworking the motor is prohibited at all.

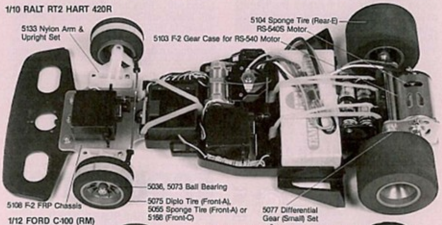
Prudent handling of motor
Do not strain a motor.
An over-worked motor has an extremely short life.

EXAMPLES OF TUNING UP

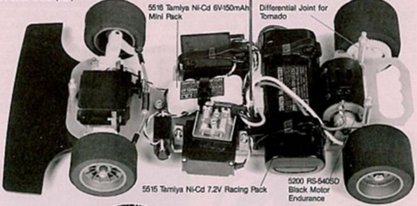
1/10 THE GRASSHOPPER


5194 Rubber Bag
5516 Tamiya Ni-Cd 6V-150mAh Mini Pack
5225 RX-540SD Technipower Motor and 5192 Subaru Brat 540 Pinion Gear Set
5224 The Grasshopper H.P. Suspension Kit
5036, 5073 Ball Bearing (9 ball bearings are used on axles and in gear box.)
5183 Buggy Spike Tires (Rear)

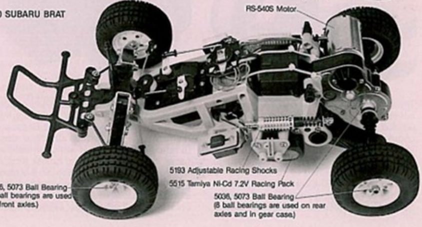
1/10 RALT RT2 HART 420R


5133 Nylon Arm & Upright Set
5104 Sponge Tire (Rear-E)
RS-540S Motor
5103 F-2 Gear Case for RS-540 Motor
5036, 5073 Ball Bearing
5108 F-2 FRP Chassis
5075 Diplo Tire (Front-A), 5055 Sponge Tire (Front-A) or 5168 (Front-C)
5077 Differential Gear (Small) Set

1/12 FORD C-100 (RM)

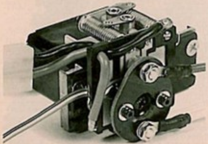

5516 Tamiya Ni-Cd 6V-150mAh Mini Pack
Differential Joint for Tornado
5515 Tamiya Ni-Cd 7.2V Racing Pack
5200 RS-540SD Black Motor Endurance

1/10 SUBARU BRAT


RS-540S Motor
5193 Adjustable Racing Shocks
5515 Tamiya Ni-Cd 7.2V Racing Pack
5036, 5073 Ball Bearing (4 ball bearings are used on front axles.)
5036, 5073 Ball Bearing (8 ball bearings are used on rear axles and in gear case.)

SWITCH SET

Racing Speed Controller (5172)



By using a terminal of silver alloy, this speed controller will transmit the battery power to the motor with little current loss, providing very high performance. It has three forward speed steps and one reverse. The top speed in the low and 2nd steps are adjustable as well as the braking force. For slippery road surfaces, a slow acceleration and soft braking are desired. By installing a diode, the 7.2V battery used for motor supply voltage, can also be used as the receiver battery, thereby saving weight in the vehicle.

PRECISION BALL BEARINGS

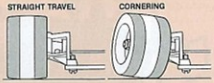
5073

Ball bearings are a must for increasing the performance of all radio controlled cars by reducing friction. Ball bearings used on the front axle boost cornering capability. At the same time, they help to prolong the battery life since the loss of energy decreases considerably.

DIPLO TIRE SET

5075 FRONT-A

These tires are the result of a new idea; the center portion of the tire is of rubber, sandwiched in between sides of sponge. It accomplishes both excellent stability on the straight and superb cornering capability. Beginning with the Countach Competition Special, it can be fitted to all other Tamiya radio control cars. The set contains 2 tires, 2 wheels, other bearing parts. The wheels are designed to accept ball bearings, available on the market as optional extras.

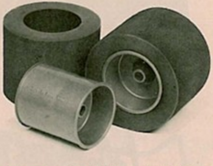


The front wheels affect the control of the car more than you may think. For gaining stability in straight travel, the traction force of the front wheels should be reduced. However, this will give understeering on bends. Reversely, with the increased traction of the front wheels, sharp turns at bends can be achieved, but on the straight, the car will lose stability and with a little turn of the steering wheel will weave and zig-zag. Diplo tires are the answer to this problem. On a straight track, the center portion of rubber will grip the road assuring a mild response and stable running; at curves the side sponge section of the tire, which has better gripping characteristics, will be in contact with the ground and will make sharp turns. The diplo tires are produced to utilize the difference between the tractability traits of rubber and sponge. They have created a new enjoyment in model car driving.

SPONGE TIRE

5169 SPONGE TIRE REAR-G (SOFT)

Sponge tire is of soft material and displays excellent road grip. Width is 35mm and dia. is 52mm. The set includes two tires and two wheels. The tire can be used as spare tire for Tornado (5832), Ford C100 (5833), for Golf (5825) and Renault (5826). Together with 5069 Bushing Set, it can be employed on the Countach CS (5808). Tires with good road grip will enhance the cornering ability and on the rear, will transmit power to road surface without loss and enhance acceleration ability.



★The sponge tire with its excellent gripping trait is ideal for a rather coarse surface, such as asphalt or concrete pavement. Because of their light weight, the tires allow the wheels to rotate easier. Against wet or smooth surfaces, the semi-pneumatic rubber tires will sometimes give better traction. So it is recommended that the tires to be used should be selected in accordance with the road surface conditions prevailing.

MABUCHI MOTOR

RS-380 and RS-540 Motors

These two motors are the most widely used electric motors in the R/C Field. The RS-380 motor is smaller, lighter and has a smaller current consumption than the RS-540. A car equipped with the RS-380 motor can run up to 30 minutes with one full charge of the Ni-Cd battery, and the car will be more easily controlled due to the slower speed provided. The RS-540 motor is much more powerful, and of course, the running time will be less due to its higher current drain. When you can handle a car with the RS-540 motor, it is said that you are in the middle class of R/C drivers.

6V-7.2V ..	◄RS-380► Normal Voltage ◄RS-540►	.. 6V-7.2V
75g-cm	Normal Load (Torque)	200g-cm
13,000 RPM	Speed at normal voltage and load	12,500 RPM
2.8A	Current at normal voltage and load	6.5A

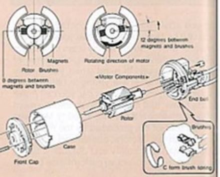
RS-540SD Black Motor Sprint
RS-540SD Black Motor Endurance

These high performance motors were developed for competition running. The physical size is the same as the RS-540. They are designed to rotate in one direction and the sprint motor will draw the most current for faster acceleration and shorter running time, with stress being placed on high RPM. About 5 minutes running is available. The Endurance motor was developed for the 8 minute races, and its power and RPM has been balanced to meet this time frame. Performance is between that of the RS-540 and The RS-540SD Black Motor Sprint.

6V-7.2V	◄Endurance► Normal Voltage ◄Sprint►	6V-7.2V
200g-cm	Normal Load (Torque)	200g-cm
14,100 RPM	Speed at normal voltage and load	16,300 RPM
6.8A	Current at normal voltage and load	7.7A

RX-540SD Technipower Motor 5225
RX-540SD Technituned Motor 5230

These are high performance competition motors designed for 8 minute track races and off road buggies. The Technipower motor has the highest RPM and torque, while the Technituned motor has the best overall efficiency, with slightly less upper RPM torque. The Technipower motor is ideal for track type racers and 4 wheeled drive buggies, while the Technituned motor is for endurance racing and all 2 wheel drive buggies. Both motors have interchangeable parts and can be tuned to your specific requirements.


Magnets
Rotor
Brushes
0 degrees between magnets and brushes
12 degrees between magnets and brushes
Rotating direction of motor
◄Motor Components►
End bel
Rotor
Case
Front Cap
Brushes
C form brush spring

6V-8.4V	Usable voltage	6V-8.4V
315g-cm (7.2V)	Torque at best RPM	290g-cm (7.2V)
20,300 RPM (7.2V)	RPM at best efficiency	17,200 RPM (7.2V)
11.2A (7.2V)	Current drain at best efficiency	9.2A (7.2V)

SILICONE INSULATED WIRE

This is a large current flow wire for use with Ni-Cd batteries. In consists of 308 0.08 dia copper wires, twisted into a large cross section to offer the least resistance to the flow of current from the battery to the motor. It is covered with a thick coat of heavy duty silicone rubber to remain flexible and easy to wire up.

ADJUSTABLE RACING SHOCKS

A damper stops or diminishes rebound from coil springs and also reduces the inherent tremor of the springs, allowing the tires to obtain a better grip on the surface. Adjustable oil dampers as used on the racing vehicles are the same as those used on full sized cars and function in the same manner. When used in conjunction with normal coil spring suspension systems the performance improvement of the vehicle is amazing. Shock dampers are available for most of the Tamiya R/C vehicles and are normally direct replacement parts, easy to install and maintain.

5193 Adjustable Racing Shocks • Suitable kits=Subaru Bra (5838), Lancia Rally (5840), The Frog (5841), The Grasshopper (5843

DIRECTLY CONNECTED SERVO SAVER

A servo protects the internal gears of the servo from breakage due to sudden shocks and movement stoppage from road surface rocks and/or collisions. The directly attached servo saver, as the name implies, is connected directly to the output shaft of the servo. It is light in weight, saves space and is strong and functional. Used in conjunction with the steering servo, it provides positive steering control while also protecting the servo from damage. Use it with the special rod-end set (5144)

5204 Directly Connected Servo Saver • Suitable kits = The Frog (5841), Porsche 956 (5842) • The following kits can be upgraded by using the 5068 Ball Link & Adjuster Rod Set or 5144 Special Rod End Set = F-2's, Holiday Buggy (5823), Sand Rover (5824), Ford C100 (5833), Tornado (5832)

RUBBER BAG SET

It is impossible to avoid the dust, dirt and moisture, when operating an off road vehicle. These rubber bags will protect your valuable equipment from these elements by covering the components with a strong, but light seal in a baloon type of cover. They are easy to install or remove, and can be used over and over, and from one vehicle to another if necessary. The protruding wiring can be sealed with silicon compound, vinyl beads or straps.

POWER SOURCE

Dry cell batteries are not powerful enough to enable you to get full enjoyment from radio controlled cars and tanks. We recommend that you use a rechargeable nickel cadmium battery or wet cell battery. The Tamiya Ni-Cd Battery packs are widely used for powering electric radio controlled models. For radio controlled tanks, the Tamiya Sealed Battery is the most appropriate. Both batteries are rechargeable and, therefore, more economical.

TAMIYA Ni-Cd BATTERY 6V-1200mAh 6V-4000mAh 7.2V-1200mAh

5502
5512
5508

TAMIYA NI-CD BATTERY

These batteries were developed for powering Tamiya radio controlled models in cooperation with the Sanyo Electric Co., Ltd. They are high performance rechargeable batteries consisting of 5 or 6 nickel cadmium cells connected in series to produce 6V or 7.2V, and are packaged in a durable plastic case for ease of handling and safety. The compact rectangular case and customized safety connector requires no extra housing of packing for installation in your model. Being rechargeable over 300 times, they are very economical.

• Nominal capacity (5 hours)—1200mAh/4000mAh • Nominal voltage-6V/7.2V • Final discharge voltage—5V/6V • Standard charging current—120mA/400mA • Maximum discharge current—4.8A/16A • Standard charging time—14—16 hours • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +45°C • Dimensions & weight—117 x 50 x 25 mm about 305 g (6V 1200mAh), 130 x 104 x 37 mm about 900 g (6V 4000mAh), 117 x 50 x 40 mm about 370 g (7.2V 1200mAh) • Produced by Sanyo Electric Co., Ltd.

TAMIYA Ni-Cd BATTERY 7.2V-1200mAh RACING PACK

5515

This is a light weight 7.2V-1200mAh racing battery consisting of 6 cells arranged flat to maintain a low center of gravity. Using the tabless method of current collection the battery can be utilized with those powerful motors requiring large current flows. Size is 46 x 130 x 24mm and weighs only 320g. Tamiya Ni-Cd quick charger or the standard trickle charger can be used. Designed for use in the Tamiya Tornado; Ford C100 and Racing Master vehicles. By employing this battery in your competition racing car, your machine will have greater running performance and maneuverability than ever before.

• Nominal capacity (5 hours)—1200mAh • Nominal voltage—7.2V • Final discharge voltage—6.0V • Standard charging current—120mA • Standard charging time—14 – 16 hours • Maximum discharge current—4.8A • Temperature range—discharge: −20°C to +60°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions—130 x 46 x 24 mm • Weight—about 310 g • Produced by Sanyo Electric Co., Ltd.

TAMIYA Ni-Cd BATTERY QUICK CHARGER

5506 6V-1200mAh
5514 6V-4000mAh
5510 7.2V-1200mAh

EXCLUSIVE QUICK CHARGER FOR USE WITH TAMIYA NI-CD BATTERIES

This is an exclusive fully automatic charger designed for safety and reliance, for quick recharging of Tamiya Ni-Cd batteries. The charger is powered from a cigarette lighter socket in a car which makes it excellent for field use. The standard charging time is only fifteen minutes; short enough to recharge the battery during an interval of the races. When the charging is completed, the charger automatically switches off and the pilot lamp goes out. A different circuit is incorporated and whilst charging, the charger is constantly checking the state of the battery. Inadequate or overcharging is impossible and an already saturated battery cannot be damaged by continued charging. Also, the charger is designed for safety against over-heating of both charger and battery. If any extraordinary heat is generated from either unit, the switch turns off automatically. Safety is very important with a quick charger, because it supplies a lot of current at a time.
The size is about 11.1cm x 7cm x 5.5cm, weighing only 220 grams; very compact and easy to carry. The length of the input cord is 80cm and the outlet cord 35cm—long enough to use. The pilot lamp will light while charging and go out when the charging is complete as an extra safe guard. All in all the Tamiya quick charger features a safe and prudent design for reliable and handy operation, adding to the enjoyment of radio controlled cars.

• Battery to charge—Tamiya Ni-Cd battery 6V 1200mAh/7.2V 1200mAh • Power source for charging—car cigarette lighter (12V negative earth) • Charging time—about 15 minutes • Temperature range for operation—0°C to 40°C • Charging capacity—70% (nominal capacity ratio is variable according to ambient conditions) • Resistance cord is provided with overheating protection • Dimensions 111 x 70 x 55 mm • Weight—about 220 g • Length of input cord—800mm • Length of output cord—350mm.

• Charger for the Tamiya Ni-Cd battery 6V-4000mAh • Power source for charging—car cigarette lighter (12V negative earth) • Charging time—approx. 60 minutes • Temperature range for operation—0°C to 40°C • Charging capacity—100% • Resistance cord provided with overheating protection • Dimensions 111 x 70 x 55mm • Weight—approx. 220g • Length of input cord—1550mm • Length of output cord—350mm

TAMIYA SEALED BATTERY 6V3.8Ah

5504

TAMIYA SEALED BATTERY

The Tamiya sealed battery is a closed type wet cell battery of 6 volts 3.8 amperes. Since it is sealed, you can lay it down without fear of leakage and it does not require to be replenished with water. You can recharge it about 100 times.

Tamiya sealed battery • Voltage—6V • Nomiani capacity (20 hours rate) 3.8Ah • Standard charging current/early stage 250mA—later 100mA • Charging time—10 to 12 hours • Dimensions—105 x 71 x 47 mm • Weight—720 g • Produced by Yuasa Battery Co., Ltd.

TAMIYA Ni-Cd BATTERY MINI PACK IS CONVENIENT, ECONOMICAL AND SUITABLE FOR GOOD PERFORMANCE

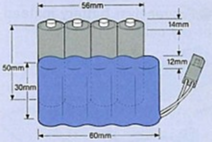
Tamiya Ni-Cd 6V Battery Mini Pack can be used conveniently as a power source for the receiver. Its size is half that of four UM(3) batteries and its weight is 2/3rds. It is effective in making performance better by lightening the weight of the R/C car. Using charging wire included with the 6V Mini Pack, it can be charged easily and quickly from a Tamiya Ni-Cd 7.2V battery. In addition to a power source for R/C cars, it can be used with other R/C models.

TAMIYA Ni-Cd BATTERY 6V-150mAh MINI PACK

5516

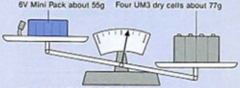
• Nominal capacity (5 hours)—150mAh • Nominal voltage—6.0V • Final discharge voltage—5.0V • Standard charging current—15mA • Standard charging time—14 – 16 hours • Maximum discharge current—60mA • Temperature range—discharge: −20°C to +45°C, Charge: 0°C to +45°C, Long preservation: −30°C to +35°C • Dimensions—60 x 30 x 12 mm • Weight—about 50 g • Produced by Sanyo Electric Co., Ltd.

<COMPACT 6V MINI PACK>



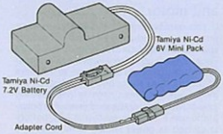
★ The size of 6V Mini Pack is a little larger than half the size of four UM3 dry cells. It doesn't need a large space.

<LIGHT 6V MINI PACK>


6V Mini Pack about 55g
Four UM3 dry cells about 77g

Weight of 6V Mini Pack is about 2/3 of four UM3 dry cells. It is very useful for reducing weight to make performance better.

● Charge of 6V Mini Pack



The capacity of 6V Mini Pack is 150mAh and is about 1/3 of a UM3 dry cell; however, it can be safely recharged over 300 times. There are 2 kinds of charging methods, normal trickle charge and quick charge with the adapter cord.

●Charging

It is possible to recharge 6V Mini Pack from Tamiya Ni-Cd 7.2V battery by utilizing the adapter cord supplied in the set. It is useful for those who use a 7.2V Ni-Cd regular battery and racing pack. Charging for 15 to 30 minutes allows for 20 to 30 minutes running as a receiver battery of a 2 channel R/C unit.

★Use for 2 channel radio control unit

★A full charge Ni-Cd 7.2V pack will charge a Mini Pack about 5 times (15 minute charge).

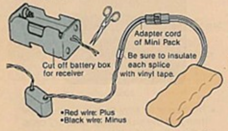
Charging time	15 min.	30 min.	60 min.
Operating time	20 min.	30 min.	40 min.

●Chargers

A suitable charger must be purchased at an electric appliance store or hobby shop. Charging times vary according to the type of charger used; however, this battery can be fully charged in 14 ~ 16 hours using the normal "trickle" charger.

USAGE EXAMPLE OF A 6V MINI PACK

●For receiver battery instead of dry cells


Adapter cord of Mini Pack
Be sure to insulate each splice with vinyl tape.
Cut off battery box for receiver
•Red wire: Plus
•Black wire: Minus

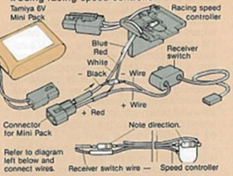
Cut wires from receiver battery box, then wire connector for Mini Pack. Correct way is to connect plus to plus and minus to minus. Refer to diagram below.

Maker	Futaba Acoms, KO	Sanwa	J R	Mini Pack exclusive connector
Plus	Red	Black w. white line	Red	Red
Minus	Black	Black	Brown	Black

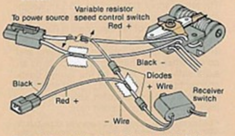
●For back up when using the same battery for receiver and motor.

If you use battery for motor and receiver power source, reducing electricity of battery will cause loss of control. If you use 6V Mini Pack as back up battery, current flows from Mini Pack to receiver and servos so that loss of control doesn't happen when battery for motor depletes. This system is ideal for long (one or two hours) endurance races. (It's possible to use a back up system if 7.2V battery is utilized as power source of motor.)

★Using racing speed controller

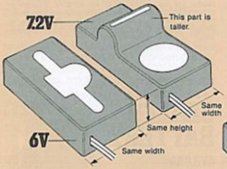


★Using variable resistor speed control switch



Connect diodes to the places shown in figure. Note polarity. Reverse connection doesn't allow current flow.
•Back up system is unsuitable for 6V battery.

HOW TO INSTALL TAMIYA 7.2V Ni-Cd BATTERY



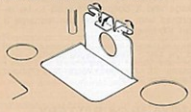
As a Tamiya Ni-Cd 7.2V battery is tall, it can't be mounted in some cars, and modification might be needed on others.

●Requires modification

1/12 Celica Turbo (5809) 1/12 Countach (5808)

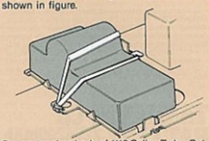
●Not suitable for installation

1/10 F-2's 1/12 Porsche 956 (5842)

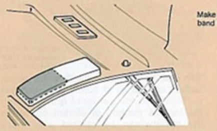


≪How to modify each car≫

1/12 Celica Turbo (5809) & 1/12 Countach LP500 (5808) need modification of chassis. Bend hooks, which are the battery holder of the mechanism deck, as shown at left below. Projected part is brought to right side as shown in figure.

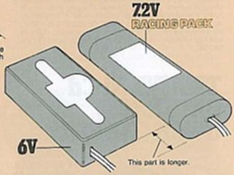


Battery touches body of 1/12 Celica Turbo. Cut away portion, as shown below, with a modeling knife.



HOW TO INSTALL TAMIYA Ni-Cd RACING PACK

Tamiya Ni-Cd 7.2V Racing Pack features large current and light weight. It's a high performance battery which is ideally suitable for competition. It's a little longer than Tamiya Ni-Cd 6V- and 7.2V-1200mAh batteries so that some cars need modification to install it and others are unsuitable.



●Requires no modification

1/12 Tornado (5832) 1/10 Opel Ascona (5837)
1/10 Audi Quattro (5836) 1/12 Ford C100 (5833)
1/10 Subaru Brat (5838) 1/10 Lancia Rally (5840)
1/10 The Frog (5841) 1/12 Porsche 956 (5842)

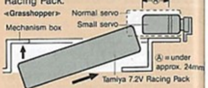
●Requires modification

1/10 Ferrari (5811) 1/10 Ligier (5812)
1/10 Williams (5819) 1/10 Lotus (5820)
1/12 Golf (5825) 1/12 Renault 5 (5826)
1/10 The Grasshopper (5843)

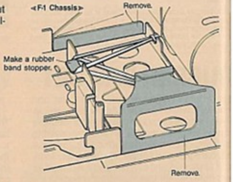
Other R/C cars can't be installed.

≪How to modify each car≫

On 1/10 Grasshopper, if a small servo is used as a steering servo, it's possible to install a 7.2V Racing Pack.

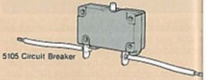


F-1's, Renault and Golf need removing battery holders of mechanism deck. F-1 racers need a rubber band catch as shown in figures, and on Golf and Renault, make long holes in mechanism deck and secure Racing Pack with nylon bands.

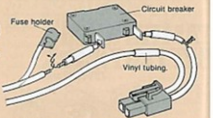


How to use circuit breaker (5105)

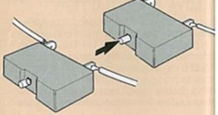
If you install a 7.2V battery or a larger motor in R/C cars using a 6V battery, replace fuse to a circuit breaker (5105)



Circuit breaker acts as a substitute for the fuse. Remove fuse holders and connect circuit breaker as shown. Fix circuit breaker on receiver with double sided tape.



If the circuit is overloaded, the button on the side of the cut-out protrudes and the current is stopped. After determining the cause, the button should be pressed in and the vehicle restarted.



TAKE CARE IN HANDLING

The Motor, the power plant; nickel cadmium battery, source of electricity; charger, to restore the energy to the batteries; speed control switch, to control velocity; all of these are essential components for enjoying the dynamic running of your cars. Misuse of them leads to unsatisfactory performance, could lead to dangerous over-heating or to a breakdown. Therefore, you are best advised to read and understand the instruction of "do's and don'ts" before use.

Motors should be operated under the appropriate voltage. Do not strain them by putting on excessive voltage.

● MOTOR

There are various kinds of motor, classified by size, the number of windings on the commutator, current draw, etc. Each motor has proper voltage and load under which they are designed to operate; excessive strain shortens their life greatly. Any defect in a motor is hard to detect from the outside. So careful handling of your motor is advised.

(1) Excessive voltage will shorten motor life.

The motor RS-380 and RS-540 are most frequently used with the radio controlled cars. They are designed to work under 6 volts. The maximum permissible voltage is 12 volts. Any excessive voltage will burn the coil in the motor and ruin it.

(2) Over-load also shortens motor life.

Output power of the motor is designated from the beginning in accordance with its size and the prospected voltage. Forcing it to overwork lets superfluous current flow in the motor which will turn to heat, resulting in over-heating. In the worst case, the electric wires of the motor will be fused together. Improper gear ratio, tight gear meshing, poor rotation of the wheels, these could be sources of strain on the motor. See if there is any part of the motor over-heating. If so, you must find out the cause. An over hot motor results in loss of speed, requiring more flow of electricity, and the battery will discharge sooner. It is almost impossible to repair a motor which has burnt out.

(3) Modified motors requires more attention. You can boost up the performance of a motor, such as its revolutions and torque, by altering the inside constituents. But the motors available on the market have been researched and developed for their well balanced factors, such as the output power, the velocity of rotation in relation to their durability. Therefore, an immoderate change in the performance elements may make the motor less powerful or have poorer durability, even when the motor's r.p.m. is improved. When you mount a modified motor in your car, you should be extra cautious not to impose any over-strain on the motor than when you are using a stock type of the motor. Chances are the conversion of a motor deteriorates the performance of the motor unless you are well qualified to do it.

● SPEED CONTROL SWITCH

Improper usage of the speed control switch will easily ruin it. Read the instruction thoroughly before use. From Tamiya, the resistor type two stepped speed control switch and the stepless variable speed control switch, which enables gradual speed change by employing a coil resistor, are on sale.

● NI-CD BATTERY

The Tamiya ni-cd battery is such a high performance power source that it is able to push out more than 30 amperes, which is equivalent to 200 watts. An erroneous handling of the battery may evoke over-heating or melting of the electric cord or the case. Possibly the battery itself will be marred completely.

Be sure not to short circuit the battery at any time

(1) Short circuit with a lot of current will melt the cord. This is one of the most dangerous faults with the Ni-Cd battery and occurs frequently. With a short circuit, a large amount of electricity will flow through the circuit in a short period of time and will generate heat. This could cause the cord to burn and the battery pack to melt. When the battery appears normal, the internal soldered points may melt and the wiring may be out of contact. An accident during a race may cause an extraordinary load to be put on the motor, having the same effect as a short circuit resulting in the ruin of the motor, wiring, switch or battery.

(2) Breaking of wiring by shock

The Tamiya ni-cd battery is packed in a hard plastic case, firm enough protect the cells from some degree of shock. However, it may be damaged by a strong impact; for example, when dropped from a high place. Although the outside case appears undamaged, the inside wiring and contacts may have broken. In either event, of course, no current would flow. Pulling or kinking the electric cord is another taboo as it may cause the contacts and connectors to become out of position.

(3) Water in the battery.

Water which penetrates into a battery may cause a short circuit or corrode the internal wiring when the electricity flows through the wet wiring. When the contacts are corroded, the internal resistance increases and the discharging characteristics decreases. Therefore, if the battery becomes wet, stop running the car and dry the battery thoroughly.

(4) Heat by over-charging is dangerous.

Over-charging shortens the battery life rapidly, especially so when the charger used is a quick charging type incorporating a timer. For instance, a charger with a 15 minutes timer charges about 5 amperes of current into a nickel cadmium battery during one charging cycle. In such a case, nickel and cadmium are expedited to react chemically and produce a gas at a rapid rate. If the charging is continued beyond the limit, chances are that heat is generated along with the gas and will melt the case or the wiring. So over-charging should be avoided under any circumstances. A feature of the Tamiya quick charger is to prevent this danger by a cut-off circuit which detects the amount of electricity in the battery and switches off the charger automatically, assuring safety of use.

★There is almost no danger of overcharging with a charger requiring 14 to 16 hours to charge.

Although over-discharging is not dangerous, you are required to be careful, because the battery may become impossible to recharge. After running your cars, make it a rule to alwasy switch off the speed controller and disconnect the battery.

●CHARGER

It is important to have the correct charger to enable you to obtain the very best performance possible from your battery.

(1) Breaking of the wiring in the circuit.

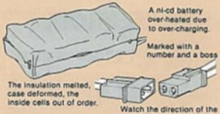
When a charger is knocked or jolted, the pilot lamp or the internal circuit may become damaged. If the portion of the circuit which controls the charging voltage and amperes snaps, the charger will not function at all.

★ An overnight type charger shows a difference in voltage from 3.5 to 4.5 volts when measured between the terminals without a battery connected. This indicates the charger works correctly. In the case of a quick charger, it does not read any voltage; this is a normal condition, if the pilot lamp is on.

(2) The reverse connection will break down the charger.

Most breakdowns to a charger can be attributed to reverse connections. Enormous current will flow through the circuit between the charger and the battery in a moment if connected reversely. An overnight type charger especially is designed to allow a little current to flow for a long time and it will burn out in a moment if connected wrongly. The Tamiya system allows that an exclusive socket is fitted to each size of battery. The charger is fitted with an equivalent exclusive plug so that only the correct charger may be used on that battery.

With the quick charger in exclusive use for the Tamiya Ni-Cd battery, you are required to watch not only the direction of the connectors, but also polarity of the 12 volt power source (negative earth). Mistakes will cause the battery to burn inside and become useless.


A ni-cd battery over-heated due to over-charging.

Marked with a number and a boss

The insulation melted, case deformed, the inside cells out of order.

Watch the direction of the upper and lower sides.

(3) Other don'ts.

A specific length of cord (produced with a designated resistance value) is used on the input side of the quick charger for the ni-cd battery. This cord should not be cut, otherwise the resistance value varies and the cord will heat or melt. Also, do not attach any connector or clip anywhere on the cord. When a cigarette lighter of a car is not used as the power source, a cigarette lighter socket available on the market should still be used. Watch the polarity!!

When a transformer from 100 or 200 volts down to 12 volts is used as the power source instead of a car cigarette lighter, though it is not recommended, the capacity of the transformer has to be 6 to 8 amperes, or else the desired charging cannot be performed.

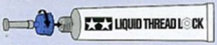
MAINTENANCE MATERIALS

Tamiya Spray Oil is an oil which utilizes a molecular chemical compound formulated in the U.S.A. which has proved effective as a long lasting lubricant. As it has strong permeability, spraying on bearings, within gear boxes, moving shafts and suspension parts, it will provide a smoother and less friction operation of all moving parts. It will also displace moisture and ensure longer rust free operation than normal penetrating lubricants. It is indispensable when operating R/C cars.

TAMIYA SPRAY OIL

After your cars have been running in the rain or through puddles, spray Tamiya Spray Oil onto the chassis or other metal surfaces. This will penetrate between the water and the metal surface to form a layer which helps to dry up the surface and also protects the metal from rusting. Since it has a cleansing function, the spray promotes the conductive power of electricity and guards the contacts of a switch against abrasion. This is a must for maintaining your radio controlled models.

LIQUID THREAD LOCK



It is essential that this liquid thread lock be applied to all nuts and screws when the model is assembled. This liquid is not a glue, but a securing agent. It will prevent screws from working loose, which will happen if it is not used. It is very effective and easy to use. At any time, screws can be loosened or removed for maintenance or repairs by using about twice the force required when they were originally tightened.

MOLYBDENUM GREASE

This is the most effective grease available to the R/C enthusiast for maintaining a vehicle in the proper running condition. It reduces friction, stays where you put it and is safe with all plastics. The minute particles of Molybdenum disulfied, in the grease, coat the parts with a film of extremely effective lubricant that will remain on the parts much longer than other oils. It maintains its viscosity over a very wide temperature range and will not fly off of moving parts like other lubricants. This Molybdenum grease will substantially prolong the life of your R/C car and it will greatly lengthen the time required between maintenance periods. The long nozzle on the tube makes it easy to get at the hard to reach places, and you will use less of this grease because it will stay where you put it.

SWITCH LUBRICANT

Your speed controller, in order for it to do the job properly, must work smoothly and respond to the slightest movement of the transmitter control. This switch lubricant will provide you with a speed controller that responds correctly each and every time. The lubricant also helps to suppress the arcing that is always present, in any high current flowing switch, and will prolong its life far longer than expected. This switch lubricant is also safe with plastics and the 10g tube is easy to use. Remember, your speed controller is next in importance to your steering, so use the lubricant periodically to ensure proper performance of your R/C car and to prolong its life.

PAINT MARKER

EXCITING NEW RELEASE FOR FINISHING MODELS OF PLASTIC AND OTHER MEDIUMS.

Easy and professional results can now be yours with Tamiya's new paint markers. Use it as you would a marking pen. Enamel paint formulated for the painting of plastics. Even the unskilled painter can now achieve beautiful results on their models. For the expert modeler, it is indispensable for detail painting and time saving. Excellent for wood, metal, glass as well as on all plastics. Shake paint marker well first, then push tip against a firm surface to break seal and start paint flow. Tamiya's paint marker ensures you of safe, easy painting without brushes and messy cleanup.

PAINTING OF R/C CAR BODIES

A large part of the enjoyment of R/C cars is in the construction and running of the vehicle; however, the final finishing and painting can also provide great pleasure. The clear bodies of polycarbonate (LEXAN) offer the greatest challenge in painting to most modelers because they are not familiar with the methods of painting these types of bodies. There are two types of bodies available for R/C vehicles. The highly detailed and true to life looking bodies are made from styrol resin and are injected molded. They are heavier and can be damaged during hard accidents on the track. Polycarbonate is thin, light and almost damage proof, but not as detailed as the styrol, and is vacuum formed.

SOME HINTS ON PAINTING

If you have a choice, paint on a clear day with little humidity. Painting on a damp day will leave the finish cloudy or milky due to "Blushing".

- ★Ventilate the painting area by opening a window
- ★Never paint near an open flame
- ★Spray paint outdoors in a windless area.

PAINTING OF INJECTED MOLDED BODIES

These bodies are made from shock resistant styrol and are from the same basic material of plastic models. Suitable paints are the Tamiya acrylics, Paint markers or other paints for plastics.

(1) Preparation

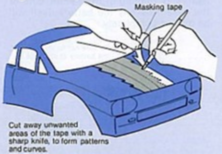
You must remove all dust and oil from the surface of the plastic by washing it well with a kitchen detergent, then rinsing it off with clear water and drying thoroughly. All of the parts that are to be painted in the same color are gathered together in one place. Joint and seam lines are cleaned up with a modeling knife and sanded down with very fine finishing paper. Hold the small parts for painting with a spring clip. If spray painting, set the parts on a box or stand to make it easy.

Clean up joints and seams with the edge of a knife blade. Finish them with fine abrasive paper.

Hold small parts with a clip.

(2) When painting many colors

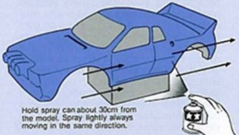
When you are adding stripes or doing different contrasting colors, masking of the area is vital. Use only a high grade of paper masking tape, not the masking tape used for full sized vehicle painting. Frisket paper and paper tape are available from good hobby shops and art stores. Remember the golden rule of painting outside surfaces: Always paint the light colors first, then go on to the darker colors. Mask small areas at a time. When doing a large area, cover it with newspaper, masking the edges of the paper with tape. When doing curves, place the tape into position, then draw in the curve with pencil, cut and remove the unwanted areas of tape with a modeling knife. Press the edges of the masking tape down firmly with your finger or toothpick.



Cut away unwanted areas of the tape with a sharp knife, to form patterns and curves.

(3) Painting

For finishing large areas, spraying is easier and the results are better. Remember to use the light colors first, then on to the darker shades. Remove any masking just prior to the paint becoming completely dry. Add any detail painting and the driver figure. Polishing with a compound will add a high gloss finish.



Hold spray can about 30cm from the model. Spray lightly always moving in the same direction.

○Spray painting hints.

- ★Spray paint about 30cm from the model.
- ★Spray a light coat for good paint adhesion. It will dry faster and you can add another coat in a few minutes.
- ★When the distance between can and model is too close, or you try to do a thick coat to finish quickly, you will get runs, and the paint will not adhere to the plastic properly.

○Brush painting hints

- ★Select the brush according to the job. Use a wide flat brush for large areas, and a fine, pointed brush for detail work.
- ★Paint only in one direction. Never back and forth like a house painter.
- ★Don't be concerned about blotches or mars at this time. Leave them and overpaint the area after it is completely dry.

○Cautions when overspraying

Accept the fact that you must not overspray acrylics and enamels with lacquers. It is perfectly acceptable and its done by the professionals to use different paints to achieve different effects. When spraying or brushing lacquers over enamels and acrylics the solvents in the lacquer will melt and distort other paints. Painting over lacquers is no problem. Use light coats for good adhesion and proper coverage. Do not try and complete the job with one coat of paint. Even when you are using the same paints, it is possible to apply a thick coat over the first coat, then end up melting the undercoat. Overspray quickly and lightly, using the same type of paint.

○Some practical advice

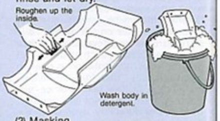
Bright colors, such as red, yellow and white, do not look good if painted over a dark color such as blue or black. Paint the surface first in flat white, then the finished red, yellow etc. will be bright.

○Painting polycarbonate bodies (LEXAN)

Lightness and toughness are features of polycarbonate bodies. Special paints are required for finishing these bodies. Normal plastic paints and lacquers will peel or chip off even with the slightest shock to the body so it is necessary to utilize polycarbonate paints especially formulated for this purpose.

(1) Preparation

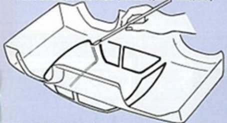
Cut off the extra portions of the body using a sharp knife, by scribing in one stroke, on the parting line. Bend the extra away from the scribed line and it will snap or tear off perfectly. Use only a very sharp knife for scribing. A dull knife causes more injuries than you can imagine. After trimming the body to the required shape, sand off the edges smooth and all of the inside surfaces (except the window areas) with 400 grit finishing paper. This will provide a good base for the paint. When sanded, wash the entire body with detergent, rinse and let dry.


Roughen up the inside.
Wash body in detergent.

(2) Masking.

As in painting styrol bodies, masking is necessary when using more than one color. As painting will be done on the inside sur faces, it is done in reverse. Paint all the details first (Window frames, driver figure, engine, etc.). Paint the darker colors first, followed by the lighter ones. If spray painting also, you must mask off the entire outside surface of the body to prevent any overspray from marring the surface.

• Paint small details first. (Window, panel lines, etc.)

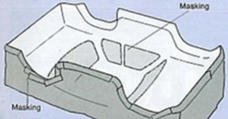


• Paint dark colors first, followed by lighter colors.

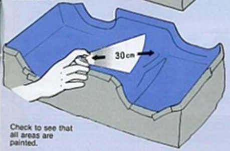
(3) Painting

As paint is applied from the inside, but viewed from the outside, the first coat (details) must appear as the outer most color when looking at the finished model. You must consider the order of your painting to achieve this effect, and as it is applied just the opposite from painting styrol bodies, you have to be thinking about it all the time.

• Mask all windows and the outside of body completely



• Spray from a distance of 30cm



Check to see that all areas are painted.

Hold the spray can about 30cm away from the body and spray the same as when doing styrol bodies. Check from the outside to make sure that you have covered all areas required. If the painted surface is uneven, let it dry and correct it later with an additional coat. When several coats are to be applied, let each dry thoroughly before applying another coat.

◎Hints

When the polycarbonate paint has dried it has a very strong film surface and the masking tape will tend to pull away the painted parts on the model. The masking tape should be removed prior to the paint drying completely. If the paint starts to peel away from the body while removing the masking tape, take a sharp knife and run the tip along the tape edge to free it from the painted surface, and it will then come off cleanly without removing the paint from the surface.

●Hints for finishing

Until the latter half of the 1960s, the racing cars at the International Races were painted in National Racing Colors which were designated for each country. However, lately they are painted in colors representing the image of sponsoring companies or the design of the merchandise package. Among the well known are the Martini stripes in red, blue and navy blue; a design from a cigarette pack in the black and yellow of the JPS Lotus; red and white of the Marlboro McLaren. Think out your own design, assuming you were a sponsoring firm.

The following is a list of some National Colors:

Japan	2 tones Red and White
UK	Green
USA	2 tones Blue and White
Italy	Red
France	Blue
Germany	Silver
Austria	Stripes of Blue and Silver
Belgium	Yellow

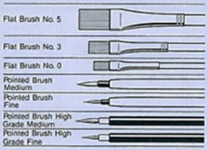
R/C BODY MAKE UP FOR PREPARATION PRIOR TO PAINTING

The decoration and finishing of R/C car bodies is not only self satisfying, but and essential part of the construction of radio control models. A beautifully finished car seems to run faster than the others and if it is an original or remodeled vehicle it will stand out conspicuously. Tamiya has made available almost all of the finishing material needed to produce a highly realistic model. They are of the highest quality, easy to use, and available from your local hobby supply house. Modeling brushes for painting; putties for repair; epoxies for remodeling; compounds for preparation of the plastics and applying the final gloss. These, and other Tamiya materials will assist you in producing a lifelike masterpiece for your enjoyment.

●For brush painting

TAMIYA MODELING BRUSHES

Tamiya produces 7 quality modeling paint brushes. They fit the hand easily and are easy to control when painting. 3 flat brushes for larger painting areas. Number 5 has a width of 15mm, Number 3 a width of 8mm and Number 0 a width of 4mm. Four pointed detail brushes are available. Two from high grade horse hair and two extremely fine brushes from high grade weasel hair. These brushes will satisfy the most discriminating modelers.



●For preparation prior to painting

TAMIYA FINISHING ABRASIVES

This is a new clog resistant, wet or dry finishing paper. These types of abrasive papers are necessary for preparation of polycarbonate bodies prior to painting and also for sanding down to final shape any molded surfaces that have been modified with putty. They are also useful for keeping the speed controller clean and polished, for better control. A medium grade set is available for wood finishing and a Fine Grade set for plastics and metal.

Medium set #180, #320 two sheets each and one sheet of #240

Fine set #400, #1000 two sheets each and one sheet of #600

●Making small parts

TAMIYA EPOXY PUTTY

This is a two part putty that can be formed just like clay. Knead the two equal length putty parts together with your fingers. It will began to harden in about an hour and will be completely cured in 12 hours. It can be carved with a modelling knife and sanded to final shape with finishing abrasives. It is useful for remodeling and repairs of plastic models.

●For filling holes and hiding seams

TAMIYA PUTTY

This is a soft, paste type of putty useful for filling holes and seam lines. It has low shrinkage and excellent adhesion on styrol type plastics. Quick drying!

●For original body construction

PLA-PLATE (WHITE) AND (TRANSPARENT)

These are sheets of styrol resin in the B4 size format. All plastic model cements and paints can be used. This plastic sheeting is excellent for modifications, repairs and original body construction. Two set sizes are available.

Pla-plate (White) 1.2mm, 0.5mm, 0.3mm 5 sheets each

Pla-plate (Transparent) 1.7mm, 0.5mm, 0.2mm 5 sheets each

●Modifications and repairs in conjunction with Pla-plate

PLASTIC BEAMS, ROUND AND SQUARE

These are beams of styrol resin in square and round cross section. Compatible with the Pla-plate plastic sheets, these beams are easy to work and use in conjunction with repairs and modifications of bodies and framework. The material is easy to form, cut and bend for complex curves and will retain its shape after forming.

Plastic Beam Square

•2mm, 3mm, 5mm (Length 40cm)

Plastic Beam Round

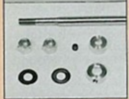
•2mm, 3mm, 5mm (Length 40cm)

●For a hand rubbed finish!

TAMIYA RUBBING/POLISHING COMPOUND

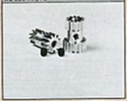
Nothing looks quite as good as a hand rubbed painted finish, so Tamiya has added a rubbing and polishing compound to the growing line of finishing products. Painting over a rough surface will leave the finish rough, so preparation prior to painting is very important. With this rubbing compound you can prepare the surface for painting quickly and easily. The compound contains minute particles of abrasives suspended in a cream. It is good for removing parting lines on the plastic, finishing up puttied areas or correcting and eliminating glue joints. Fine scratches and blemishes on clear plastic parts, such as windshields and aircraft canopies, can be completely removed. It is also useful for polishing metal parts and will even remove rust and oxidation coatings. A deep and beautiful gloss can be achieved on painted surfaces. Each tube of contains 20g of this special polishing/rubbing compound. For removing parting lines, finishing off puttied areas or correcting glue seams, first remove the excess with a modeling knife, then sand the area down to the surface with #1000 grit paper. Apply a small amount of compound to a clean cotton cloth and polish the sanded surface until it is gloss smooth. Remove excess compound with another clean cloth. Compound trapped in hollows or panel lines can be removed by dipping into water and running a wooden toothpick down the area. Use if for polishing out the cloudy surfaces of lacquer paints and for adding a deep gloss to acrylics. *NOTE: Not recommended for use on Tamiya Paint Marker finishes.

5009 REAR SHAFT SET

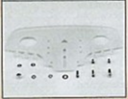


5011 DIFFERENTIAL GEAR SET

5012 PINION GEAR SET FOR RS-380 MOTOR



5014 ABS BUMPER SET

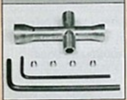


5015 FUSE SET (15A)

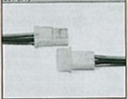
5025 DOUBLE SIDED SERVO TAPE SET

5036 BALL BEARING SET (2 PCS.)

5038 TOOL SET

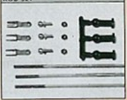


5039 BATTERY CONNECTOR SET (6V)

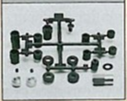


5054 VARIABLE RESISTOR SPEED CONTROL SWITCH

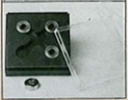
5068 BALL LINK & ADJUSTER ROD SET



5069 BUSHING SET



5073 BALL BEARING SET (4 PCS.)



5077 DIFFERENTIAL GEAR (SMALL) SET

5085 F-1 BUMPER SET

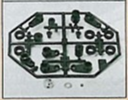
5089 UPRIGHT SET (2 PCS.)

5090 SPECIAL PINION GEAR SET FOR RS-540 MOTOR (22 AND 24T)

5091 WHEEL STOPPER SET

5101 F-2 SWITCH SET

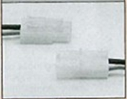
5102 F-2 BUSHING SET



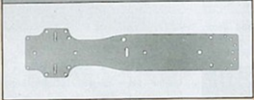
5103 F-2 GEAR CASE FOR RS-540 MOTOR

5105 CIRCUIT BREAKER

5106 7.2V CONNECTOR SET

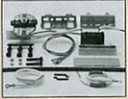


5108 F-2 FRP CHASSIS



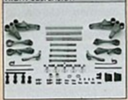
5112 1/10 RACING BUGGY STICKER SET

5113 1/10 RACING BUGGY SWITCH SET



5114 1/10 RACING BUGGY REAR GUARD

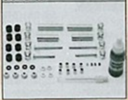
5115 1/10 RACING BUGGY FRONT SUSPENSION



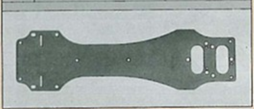
5116 1/10 RACING BUGGY REAR SUSPENSION

5117 1/10 RACING BUGGY UNIVERSAL JOINT

5118 1/10 RACING BUGGY DAMPER SET

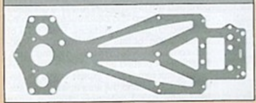


5123 CS FRP CHASSIS



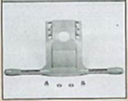
5128 1/10 RACING BUGGY UPRIGHT SET

5124 F-1 FRP CHASSIS

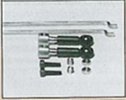


5133 NYLON ARM & UPRIGHT SET

5135 BUGGY BUMPER SET



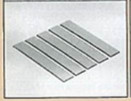
5144 SPECIAL ROD END SET



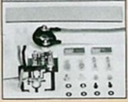
5155 SERVO SAVER SET

5170 NYLON BAND SET

5171 HEAT RESISTANT DOUBLE SIDED SERVO TAPE SET



5172 RACING SPEED CONTROLLER



5173 DIFFERENTIAL GEAR (MEDIUM) SET

5174 ALUMINUM PINION GEAR SET (16 AND 17T)

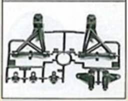
5175 ALUMINUM PINION GEAR SET (18 AND 20T)

5176 TORNADO REAR SHAFT SET

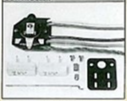
5177 TORNADO FRONT ARM SET

5178 TORNADO BUMPER

5181 WILD WILLY FRONT ARM SET



5182 3 STEP SPEED CONTROLLER

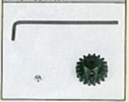


5186 SILICONE INSULATED WIRE

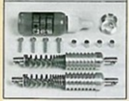
5188 FORD C-100 BUMPER

5189 RS-540SD BLACK MOTOR SPRINT

5192 SUBARU BRAT 540 PINION GEAR SET

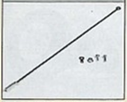


5193 ADJUSTABLE RACING SHOCKS



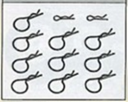
5194 RUBBER BAG SET

5195 STEEL ANTENNA



5196 BUGGY BALLRACE SET

5197 SNAP PIN SET



5198 TORNADO DIFFERENTIAL JOINT

5200 RS-540SD BLACK MOTOR ENDURANCE

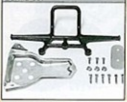
5201 WELL NUT (2 PCS.)

5204 DIRECTLY CONNECTED SERVO SAVER

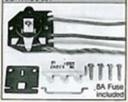
5205 DIFFERENTIAL GEAR SET (BRAT, FROG, LANCIA)

5207 HALF SHAFT SET

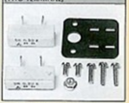
5208 ORV BUMPER AND GUARD SET



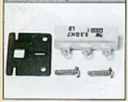
5209 GRASSHOPPER SPEED CONTROL SET



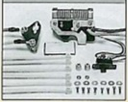
5211 CERAMIC RESISTORS (TWO TERMINAL)



5212 CERAMIC RESISTOR (THREE TERMINAL)



5214 956 SPEED CONTROLLER

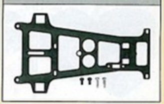


5215 956 REAR SHAFT

5218 FLAT WIRE WOUND RESISTOR

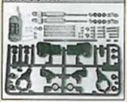
5220 PORSCHE 956 CHASSIS

5221 PORSCHE 956 MECHANISM DECK



5222 PORSCHE 956 RACING STICKER SET

5224 THE GRASSHOPPER H.P. SUSPENSION KIT



5225 RX-540SD TECHNIPOWER MOTOR

5226 RX-540SD TECHNIPOWER MOTOR BRUSH SET

5227 RX-540SD TECHNIPOWER MOTOR ROTOR

5228 PLASTIC BEARING SET

5230 RX-540SD TECHNITUNED MOTOR

5231 RX-540SD TECHNITUNED MOTOR ROTOR

5232 NYLON UPRIGHT SET (2 PCS.)

5237 BUGGY SPEED CONTROLLER

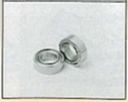
5238 BUGGY PINION GEAR SET (13T, 14T)

5239 BUGGY PINION GEAR SET (15T, 16T)

5240 BUGGY PINION GEAR SET (17T, 19T)

5241 HOTSHOT BALL BEARING SET

5242 850 BALL BEARING SET (2 PCS.)



5005 RS-380S MOTOR SET

5244 HOTSHOT UPRIGHT SET

5055 SPONGE TIRE SET 'FRONT-A' WITH WHEEL

5056 SPONGE TIRE SET 'REAR-A' WITH WHEEL

5057 SPONGE TIRE SET 'REAR-B' WITH WHEEL

5058 SPONGE TIRE SET 'REAR-C' WITH WHEEL

5074 RUBBER TIRE SET 'FRONT-A' WITH WHEEL

5075 DIPLO TIRE SET 'FRONT-A' WITH WHEEL

5076 SPONGE TIRE SET 'REAR-D' WITH WHEEL

5096 RUBBER TIRE SET 'REAR-D' WITH WHEEL

5104 SPONGE TIRE 'REAR-E' WITH WHEEL

5119 ROUGH RIDER SPARE TIRE 'FRONT' WITH WHEEL

5120 ROUGH RIDER SPARE TIRE 'REAR' WITH WHEEL

5121 SAND SCORCHER SPARE TIRE 'FRONT' WITH WHEEL

5122 SAND SCORCHER SPARE TIRE 'REAR' WITH WHEEL

5137 SPONGE TIRE SET 'FRONT-B' WITH WHEEL

5138 SPONGE TIRE SET 'REAR-F' WITH WHEEL

5150 MOLDED SPONGE TIRE 'FRONT-A' WITH WHEEL

5152 HOLIDAY BUGGY SPARE TIRE 'FRONT' WITH WHEEL

5153 HOLIDAY BUGGY SPARE TIRE 'REAR' WITH WHEEL

5156 FORD RANGER TIRE WITH WHEEL

5162 TOYOTA 4X4 PICKUP TIRE WITH WHEEL

5168 SPONGE TIRE (FRONT-C)

5169 SPONGE TIRES (REAR-G)

5179 WILD WILLY TIRES

5183 BUGGY SPIKE TIRES (REAR)

5185 BUGGY SPONGE TIRES (REAR)

5216 SPONGE TIRE (FRONT-D)

5217 SPONGE TIRE (REAR-H)

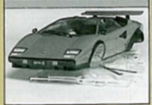
5233 4WD OVAL BLOCK TIRE FRONT

5234 4WD OVAL BLOCK TIRE REAR

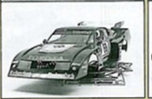
5235 4WD PIN SPIKE TIRE FRONT

5236 4WD PIN SPIKE TIRE REAR

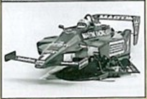
5062 COUNTACH BODY PARTS SET



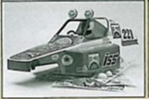
5081 CELICA LB TURBO BODY PARTS SET



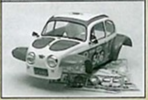
5109 MARTINI LOTUS 79 BODY PARTS SET



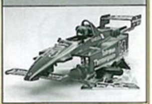
5110 ROUGH RIDER BODY PARTS SET



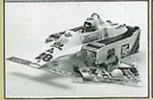
5111 SAND SCORCHER BODY PARTS SET



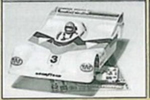
5129 RALT BODY PARTS SET



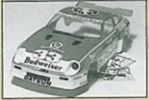
5131 WILLIAMS BODY PARTS SET



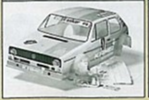
5145 TORNADO RM-1 BODY PARTS SET



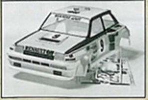
5151 DATSUN 280ZX BODY PARTS SET



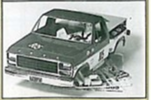
5157 GOLF RACING BODY PARTS SET



5158 RENAULT 5 TURBO BODY PARTS SET



5159 FORD RANGER BODY PARTS SET



5161 TOYOTA 4X4 PICKUP BODY PARTS SET

5166 HONDA F-2 BODY PARTS SET

5167 BRABHAM BT50 BODY PARTS SET

5180 WILD WILLY BODY PARTS SET

5184 SUPER CHAMP BODY PARTS SET

5187 FORD C100 BODY PARTS SET

5190 AUDI QUATTRO RALLY BODY PARTS SET

5191 SUBARU BRAT BODY PARTS SET

5199 WILLY'S WHEELER (HONDA CITY TURBO RACING) BODY PARTS SET

5202 OPEL ASCONA 400 RALLY BODY PARTS SET

5203 LANCIA RALLY BODY PARTS SET

5206 THE FROG BODY PARTS SET

5210 GRASSHOPPER BODY PARTS SET

5213 956 BODY PARTS SET

5219 MITSUBISHI PAJERO BODY PARTS SET

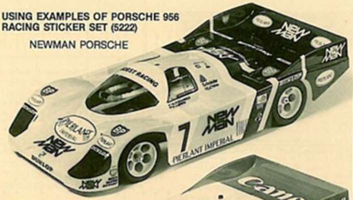
5223 THE HORNET BODY PARTS SET

5229 TOYOTA TOM'S 84C BODY PARTS SET

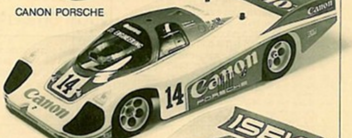
5243 HOTSHOT BODY PARTS SET

USING EXAMPLES OF PORSCHE 956 RACING STICKER SET (5222)

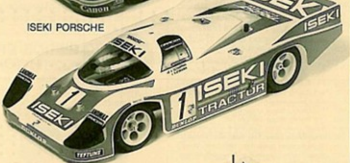
NEWMAN PORSCHE



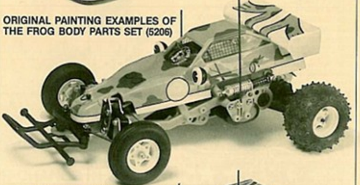
CANON PORSCHE



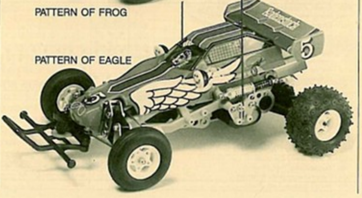
ISEKI PORSCHE



ORIGINAL PAINTING EXAMPLES OF THE FROG BODY PARTS SET (5206)



PATTERN OF FROG



PATTERN OF EAGLE

R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger		Honda F-2	Porsche 956	TOM'S 84C	Super Champ	Wild Willy	Quattro Rally	Subaru Brat	Opel Ascona	Lancia Rally	The Frog	The Grasshopper	Pajero	Hornet	Fast Attack Vehicle	Hotshot 4WD	Bruiser
5009	Rear Shaft Set					●															
5011	Differential Gear Set																				
5012	Pinion Gear Set for RS-380 Motor																				
5014	ABS Bumper Set																				
5015	Fuse Set (15A)		●	●		●										●	●	●			
5025	Double Sided Servo Tape Set	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5036	Ball Bearing Set (2 pcs.)					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5038	Tool Set	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5039	Battery Connector Set (6V)	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5054	Variable Resistor Speed Control Switch	●	●	●																	
5055	Sponge Tire Set 'Front-A' with Wheel					●	●	●													
5056	Sponge Tire Set 'Rear-A' with Wheel						●	●													
5057	Sponge Tire Set 'Rear-B' with Wheel																				
5058	Sponge Tire Set 'Rear-C' with Wheel																				
5062	Countach Body Parts Set																				
5068	Ball Link & Adjuster Rod Set	●	●	●		●	●	●				●		●	●	●	●	●	●		
5069	Bushing Set																				
5073	Ball Bearing Set (4 pcs.)					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5074	Rubber Tire Set 'Front-A' with Wheel					●	●	●													
5075	Diplo Tire Set 'Front-A' with Wheel					●	●	●													
5076	Sponge Tire Set 'Rear-D' with Wheel																				
5077	Differential Gear (Small) Set					●															
5081	Celica LB Turbo Body Parts Set																				
5085	F-1 Bumper Set					●															
5089	Upright Set (2 pcs.)																				
5090	Special Pinion Gear Set for RS-540 Motor					●	●	●													
5091	Wheel Stopper Set					●															
5096	Rubber Tire Set 'Rear-D' with Wheel					●															
5101	F-2 Switch Set					●															
5102	F-2 Bushing Set					●															
5103	F-2 Gear Case for RS-540 Motor					●															
5104	Sponge Tire 'Rear-E' with Wheel					●															
5105	Circuit Breaker	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5106	7.2V Connector Set	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5108	F-2 FRP Chassis					●															
5109	Martini Lotus 79 Body Parts Set																				
5110	Rough Rider Body Parts Set								●												
5111	Sand Scorcher Body Parts Set																				
5112	1/10 Racing Buggy Sticker Set								●	●	●	●	●	●	●	●	●	●	●	●	●
5113	1/10 Racing Buggy Switch Set																				
5114	1/10 Racing Buggy Rear Guard																				
5115	1/10 Racing Buggy Front Suspension								●												
5116	1/10 Racing Buggy Rear Suspension																				
5117	1/10 Racing Buggy Universal Joint								●	●	●		●								●
5118	1/10 Racing Buggy Damper Set								●												
5119	Rough Rider Spare Tire 'Front' with Wheel								●			●		●	●	●	●	●	●		
5120	Rough Rider Spare Tire 'Rear' with Wheel								●			●		●	●	●	●	●	●		
5121	Sand Scorcher Spare Tire 'Front' with Wheel								●			●		●	●	●	●	●	●		
5122	Sand Scorcher Spare Tire 'Rear' with Wheel								●			●		●	●	●	●	●	●		
5123	CS FRP Chassis																				
5124	F-1 FRP Chassis																				
5128	1/10 Racing Buggy Upright Set								●			●		●	●						
5129	Ralt Body Parts Set					●															
5131	Williams Body Parts Set																				
5133	Nylon Arm & Upright Set					●															
5135	Buggy Bumper Set								●												
5137	Sponge Tire Set 'Front-B' with Wheel					●	●	●													
5138	Sponge Tire Set 'Rear-F' with Wheel																				
5144	Special Rod End Set								●	●	●		●								
5145	Tornado RM-1 Body Parts Set																				
5150	Molded Sponge Tire 'Front-A' with Wheel					●	●	●													
5151	Datsun 280ZX Body Parts Set																				
5152	Holiday Buggy Spare Tire 'Front' with Wheel								●			●		●	●	●	●	●	●		
5153	Holiday Buggy Spare Tire 'Rear' with Wheel								●			●		●	●	●	●	●	●		
5155	Servo Saver Set								●												
5156	Ford Ranger Tire with Wheel								●			●		●	●	●	●	●	●		
5157	Golf Racing Body Parts Set																				
5158	Renault 5 Turbo Body Parts Set																				
5159	Ford Ranger Body Parts Set																				
5161	Toyota 4X4 Pickup Body Parts Set																				
5162	Toyota 4X4 Pickup Tire with Wheel																				
5166	Honda F-2 Body Parts Set					●															
5167	Brabham BT50 Body Parts Set																				
5168	Sponge Tires (Front-C)					●	●	●													
5169	Sponge Tires (Rear-G)						●	●													
5170	Nylon Band Set	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5171	Heat Resistant Double Sided Servo Tape Set	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5172	Racing Speed Controller								●												
5173	Differential Gear (Medium) Set						●	●													
5174	Aluminum Pinion Gear Set (16 and 17T)					●	●	●													
5175	Aluminum Pinion Gear Set (18 and 20T)					●	●	●													
5176	Tornado Rear Shaft Set																				
5177	Tornado Front Arm Set																				
5178	Tornado Bumper																				
5179	Wild Willy Tires									●											
5180	Wild Willy Body Parts Set									●											
5181	Wild Willy Front Arm Set									●	●		●								
5182	3 Step Speed Controller									●	●	●	●	●	●						
5183	Buggy Spike Tires (Rear)								●			●		●	●	●	●	●	●		
5184	Super Champ Body Parts Set								●												
5185	Buggy Sponge Tires (Rear)								●												

R/C SPARE PARTS

NO.		Leopard	Gepard	King Tiger		Honda F-2	Porsche 956	TOM'S 84C	Super Champ	Wild Willy	Quattro Rally	Subaru Brat	Opel Ascona	Lancia Rally	The Frog	The Grasshopper	Pajero	Hornet	Fast Attack Vehicle	Hotshot 4WD	Bruiser
5186	Silicone Insulated Wire	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5187	Ford C100 Body Parts Set																				
5188	Ford C100 Bumper																				
5189	RS-540SD Black Motor Sprint						●	●	●						●			●	●	●	
5190	Audi Quattro Body Parts Set										●		●								
5191	Subaru Brat Body Parts Set								●			●		●							
5192	Subaru Brat 540 Pinion Gear Set											●		●	●	●	●	●	●	●	
5193	Adjustable Racing Shocks											●		●	●	●	●		●		
5194	Rubber Bag Set	●	●	●		●	●	●	●			●		●	●	●	●	●			
5195	Steel Antenna						●	●												●	
5196	Buggy Ballrace Set								●												
5197	Snap Pin Set					●	●	●	●	●	●	●	●	●	●		●	●		●	●
5198	Tornado Differential Joint																				
5199	Willy's Wheeler (Honda City Turbo Racing) Body Parts Set																				
5200	RS-540SD Black Motor Endurance						●	●	●	●	●		●		●		●	●	●	●	
5201	Well Nut (2 pcs.)																				
5202	Opel Ascona 400 Rally Body Parts Set										●		●								
5203	Lancia Rally Body Parts Set											●		●							
5204	Directly Connected Servo Saver					●	●	●				●		●	●	●	●	●	●	●	●
5205	Differential Gear Set (Brat, Frog, Lancia)											●		●	●						
5206	The Frog Body Parts Set											●		●	●						
5207	Half Shaft Set											●		●	●				●		
5208	ORV Bumper & Guard Set										●	●	●	●	●	●		●	●		
5209	Grasshopper Speed Control Set															●	●	●			
5210	Grasshopper Body Parts Set															●					
5211	Ceramic Resistors (Two Terminal)									●	●	●	●	●	●						
5212	Ceramic Resistor (Three Terminal)															●	●	●	●		●
5213	Porsche 956 Body Parts Set						●	●													
5214	Porsche 956 Speed Controller						●	●													
5215	Porsche 956 Rear Shaft						●	●													
5216	Sponge Tires (Front-D)					●	●	●													
5217	Sponge Tires (Rear-H)						●	●													
5218	Flat Wire Wound Resistor						●	●													
5219	Mitsubishi Pajero Body Parts Set																●				
5220	Porsche 956 Chassis						●														
5221	Porsche 956 Mechanism Deck						●	●													
5222	Porsche 956 Racing Sticker Set						●														
5223	The Hornet Body Parts Set																	●			
5224	The Grasshopper H.P. Suspension Kit															●		●			
5225	RX-540SD Technipower Motor					●	●	●							●		●	●	●	●	
5226	RX-540SD Technipower Motor Brush Set																				
5227	RX-540SD Technipower Motor Rotor																				
5228	Plastic Bearing Set															●	●	●	●	●	
5229	Toyota TOM'S 84C Body Parts Set						●	●													
5230	RX-540SD Technituned Motor					●	●	●							●		●	●	●	●	
5231	Technituned Motor Rotor																				
5232	Nylon Upright Set (2 pcs.)					●										●	●	●	●		
5233	4WD Oval Block Tire Front																			●	
5234	4WD Oval Block Tire Rear																			●	
5235	4WD Pin Spike Tire Front																			●	
5236	4WD Pin Spike Tire Rear																			●	
5237	Buggy Speed Controller																			●	
5238	Buggy Pinion Gear Set (13T, 14T)																			●	
5239	Buggy Pinion Gear Set (15T, 16T)														●				●	●	
5240	Buggy Pinion Gear Set (17T, 19T)														●					●	
5241	Hotshot Ball Bearing Set																			●	
5242	850 Ball Bearing Set											●		●		●	●	●	●	●	
5243	Hotshot Body Parts Set																			●	
5244	Hotshot Upright Set																			●	
5245	Snap Connector Set	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5005	RS-380 Motor Set											●		●		●					

POWER SOURCE

NO.		Leopard	Gepard	King Tiger		Honda F-2	Porsche 956	TOM'S 84C	Super Champ	Wild Willy	Quattro Rally	Subaru Brat	Opel Ascona	Lancia Rally	The Frog	The Grasshopper	Pajero	Hornet	Fast Attack Vehicle	Hotshot 4WD	Bruiser
5502	Ni-Cd Battery 6V					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5508	Ni-Cd Battery 7.2V								●	●	●	●	●	●	●	●	●	●	●	●	●
5512	Ni-Cd 6V-4000mAh Battery																				●
5515	Ni-Cd Racing Pack 7.2V-1200mAh						●	●			●	●	●	●	●			●	●	●	●
5516	Ni-Cd Mini Pack 6V-150mAh	●	●	●		●			●	●	●	●	●	●	●	●	●	●	●		●
5504	Sealed Lead Acid Battery 6V	●	●	●																	
5506	Ni-Cd Battery Quick Charger 6V					●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5514	Ni-Cd Battery Quick Charger 6V-4000mAh																				●
5510	Ni-Cd Battery Quick Charger 7.2V						●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

SOME IDEAS OF CAR DECORATION

Decorate your car, the fruit of your effort, as pretty as possible. Plastic bodies of the radio controlled electric model cars today are made so lifelike that they can be displayed as stationary models.
From Tamiya, figures of the driver, mechanic, team manager and a tool set in 1/12 scale are already on the market. Arrange them around your car and you can make a nice lively decoration for display where your car certainly will look better.

1:12th SCALE MOTOR RACING TEAM SERIES

1 DRIVER
2201

This is a doll of a driver in a racing suit with a helmet in his hand. The helmet is a full face type, a visor is furnished as a separate part, a pair of gloves can be put into the helmet.

With PORSCHE 956

2 MECHANIC<WHEEL CHANGING>
2202

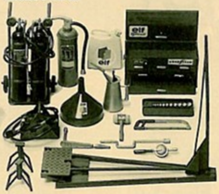
Tires play a vital role for a racing car. The tire manufacturers are struggling for better quality so intensely that it is called a "War of Tires". This is a figure of a mechanic holding a wheel wrench and unscrewing the nuts. A cross wrench, an air wrench, and a hammer are included in the kit.

With PORSCHE 956

With TOYOTA TOM'S 84C

3 MECHANIC<ENGINE TUNING>
2203

A powerful racing car engine requires very delicate tuning up. This is a doll of a mechanic handling a plug wrench in his hand and checking plugs of the engine. The garment he wears is a mechanic's suit, called a coverall. A plug box and a plug wrench are included in the kit.



4 TOO SET
2204

Repair of the machine is done in the pit; also a piece of advice or two may be given to the driver. Many typical tools for racing cars are included: from big devices as a jack and a welder to small tools which are supposed to function as fingertips of a mechanic. A set of very useful and helpful accessories.

With TOYOTA TOM'S 84C

5 TEAM MANAGER
2205

Taking the leadership of the team aiming at victory, the team manager is giving a piece of advice to the driver with one hand placed upon the car body. He is in a sweater and a jacket, having a sport cap on; the jacket consists of separate parts to create a feeling of reality.

ORIGINAL CAR BODY

In the real car world, there are many kinds of races: of formula cars, of 2 seater open racing cars, of remodelled machines from the cars on the market. It must be delightful to create model cars which cannot be obtained from the kits. These days many modelers are to be seen participating in races with their own car body or with remodelled cars from plastic model kits. It might be an exciting idea to run a classic car on the circuit. Some skillfulness at model building may be a must, but it is a challenging job.

1. USING PLASTIC MODEL BODIES

The most handy and simple way of creating your own body is to utilize car bodies of plastic models in the same scale. The scale allows reproducing the details; as a result, some portion of parts may be going to waste. And you have to figure it out previously whether or not there is enough space to install radio control units. When not, the chassis is sometimes transformed considerably. Also, the body may have to be reinforced sufficiently in case of collision.

2. MAKING BODIES OF YOUR OWN

Your bodies can be made based upon a real car or on your own design. In either case, some dexterity is called for. As for material, plastic plate and thin cardboard are often used.

3. MINOR CHANGE IN KIT BODIES

Only a little modification on a kit body may be needed for making an enjoyable car, from a roofed car to an open type vehicle or an additional wing to the body or changing the front silhouette of a car.

★ADVICE FOR REMODELLING
You can remodel a car in any way you like for your own enjoyment. But if you have an intention of joining a race with it, it is recommended that your work will not be too different from real cars. Always keep in consideration to make it well balanced in function and in make up of each portion of a car. Some races will not allow cars to participate which are excessively remodelled.

TAMIYA COLOR

TAMIYA ACRYLIC PAINTS
The new Tamiya paints are made from water-soluble acrylic resins, are easy to use, and will ensure an excellent finish to your prize models. These new paints come in 16 glossy colors, 45 matt finish colors, plus 7 transparent colors and a flat base for producing a semi-gloss from the gloss colors. Each bottle contains 23ml and because of the excellent coverage, will last longer and be more economical than other paints.

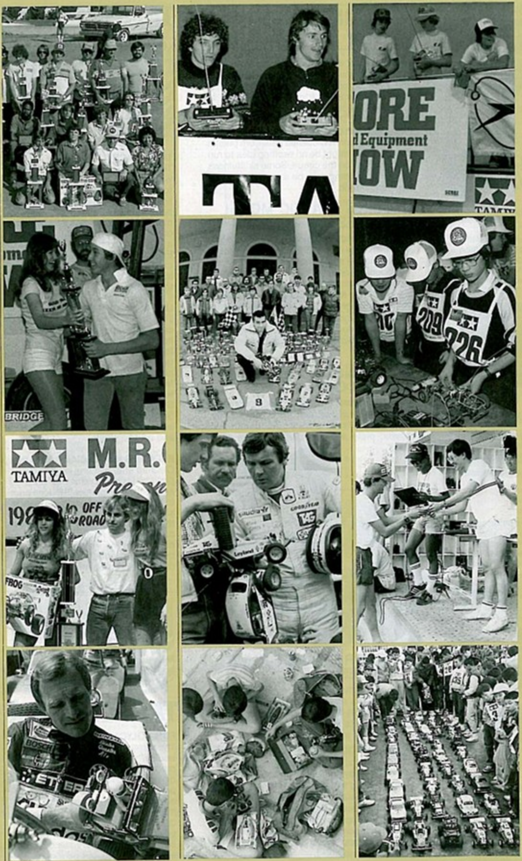
USE ON ANY MATERIAL
The Tamiya acrylic paints are excellent for painting wood, metal, home appliances, styrol resins, styrofoam and in fact just about any surface will accept acrylics. It retains its high gloss permanently and will not fade. Since it is smooth flowing, unwanted bubbles are never a problem. Since it contains no lead, it is safer. Sprayed or brushed, Tamiya acrylics add the final touch to your modeling and artistic skills.

REQUIRES NO SPECIAL HANDLING
Cleanup after painting is no chore as plain water will cleanse all brushes and painting implements if done prior to drying. The large heavy glass jar is stable and hard to tip over, and with the large mouth, large flat brushes can be utilized. As the bottle caps are moulded in the exact same color as the paint, location of the special color is never a problem.

TAMIYA COLOR

FOR POLYCARBONATE
The painting of polycarbonate (Lexan) bodies has always presented some problems. Tamiya has developed this new paint exclusively for use on polycarbonate bodies. It can be brushed or sprayed and once set it will remain flexible, and resist the peeling or chipping that is common with painted polycarbonate following collisions or upsets. It is water based for ease of cleanup, but permanet.

WORLD R/C SCENES



1/10 SCALE RADIO CONTROL CAR

5830	Honda F-2 Competition Special
5834	Super Champ
5835	Wild Willy
5836	Audi Quattro Rally
5837	Opel Ascona 400 Rally
5838	Subaru Brat
5840	Lancia Rally
5841	The Frog
5843	The Grasshopper
5844	Mitsubishi Pajero
5845	The Hornet
5846	Fast Attack Vehicle
5847	Hotshot 4WD
5848	Toyota 4×4 Pickup Bruiser

1/12 SCALE RADIO CONTROL CAR

5842	Porsche 956 Racing Master Mk.5
5849	Toyota TOM'S 84C Racing Master Mk.6

1/16 SCALE R/C TANK SERIES

5602	West German Leopard A4 Tank
5603	West German Flakpanzer Gepard
5604	German King Tiger

BATTERY AND QUICK CHARGER

5502	Ni-Cd Battery 6V
5504	Sealed Lead Acid Battery 6V
5506	Ni-Cd Battery Quick Charger 6V
5508	Ni-Cd Battery 7.2V
5510	Ni-Cd Battery Quick Charger 7.2V
5512	Ni-Cd 6V-4000mAh Battery
5514	Ni-Cd Battery Quick Charger 6V-4000mAh
5515	Ni-Cd Racing Pack 7.2V-1200mAh
5516	Ni-Cd Mini Pack 6V-150mAh

MAINTENANCE MATERIAL & COLOR

8703	Tamiya Cement (40ml)
8704	Tamiya Liquid Thread Lock
8705	Tamiya Oil Spray
8706	Tamiya Putty
8709	Tamiya Finishing Abrasives (Medium Set)
8710	Tamiya Finishing Abrasives (Fine Set)
8711	Tamiya Cement Pen
8712	Tamiya Cement (20ml)
8713-8719	Tamiya Modeling Brushes
8720	Tamiya Epoxy Putty
8721	Tamiya Rubbing/Polising Compound
8722	Tamiya Molybdenum Grease
8723	Tamiya Switch Lubricant
Tamiya Acrylic Paint (68 colors + Thinner + Flat Base)	
Tamiya Paint Marker (12 colors)	
8201-8212	Tamiya Color for Polycarbonate (12 colors)

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R/C ACTION IN AMERICA
アメリカのオフロードレース風景

TAMIYA
RADIO CONTROL GUIDE BOOK

TAMIYA

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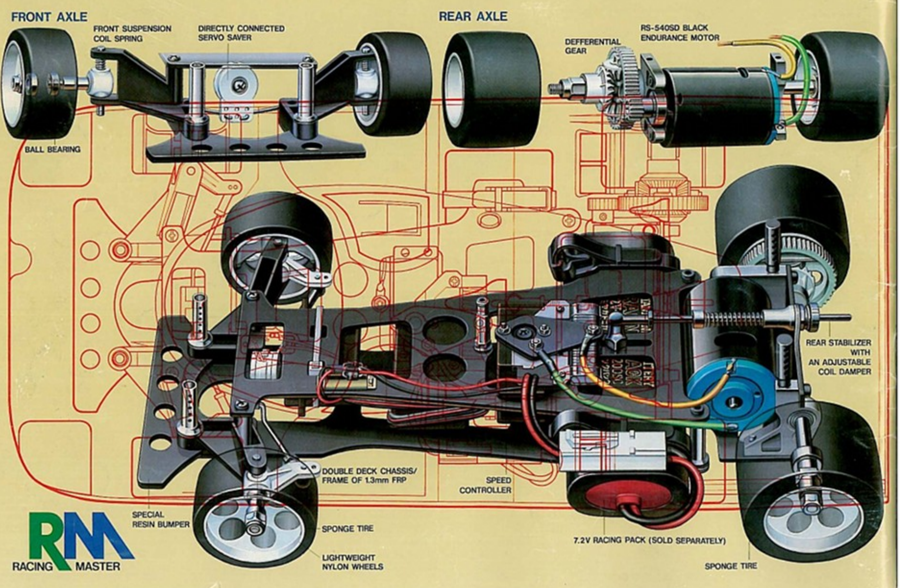
628, OSHIKA SHIZUOKA-CITY, JAPAN.


FRONT AXLE
FRONT SUSPENSION COIL SPRING
DIRECTLY CONNECTED SERVO SAVER
BALL BEARING
REAR AXLE
DEFFERENTIAL GEAR
RS-540SD BLACK ENDURANCE MOTOR
REAR STABILIZER WITH AN ADJUSTABLE COIL DAMPER
DOUBLE DECK CHASSIS/ FRAME OF 1.3mm FRP
SPEED CONTROLLER
SPECIAL RESIN BUMPER
SPONGE TIRE
LIGHTWEIGHT NYLON WHEELS
7.2V RACING PACK (SOLD SEPARATELY)
SPONGE TIRE

RACING MASTER